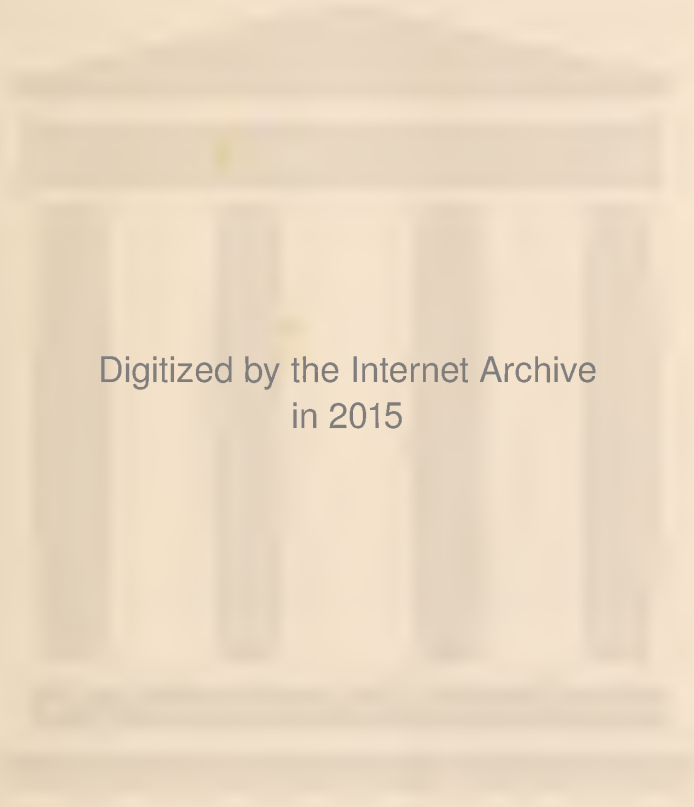

MARYLAND

Agricultural Experiment Station.

BULLETIN, NO. 30,

SPECIAL ISSUE.

COMPOSITION OF

COMMERCIAL FERTILIZERS

SOLD IN THIS STATE.

THE FERTILIZER LAW.

APPENDIX: TABLE FOR CALCULATING FERTILIZER ANALYSES

AND VALUATION.

COLLEGE PARK, MD.

JANUARY, 1895.

MARYLAND

Agricultural Experiment Station.

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NOTE: Under the laws of Maryland, the inspection, sampling and analysis of commercial fertilizers is to be done under the auspices of the Maryland Agricultural College, by the Professor of Chemistry of the College, who is ex-officio State Chemist. The results of these examinations, being agricultural information of value and general interest, will be published, from time to time, as Special Bulletins, from the Maryland Agricultural Experiment Station.

These Bulletins will be mailed, free, to any farmer who asks for them.

Address:
MARYLAND AGRICULTURAL EXPERIMENT STATION,
COLLEGE PARK, MARYLAND.

INSPECTION AND ANALYSIS OF

COMMERCIAL FERTILIZERS SOLD IN MARYLAND

BY THE CHEMICAL DEPARTMENT OF THE

MARYLAND AGRICULTURAL COLLEGE.

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Explanation of terms used in Fertilizer Analysis.

"Phosphoric Acid" is a compound of the element phosphorus with oxygen. It is the compound formed when phosphorus burns in the air. As it is found in fertilizer it is always in combination with some "base," generally lime. The relative amount of lime with which it is combined determines its solubility.

"Soluble Phosphoric Acid" is dissolved by water. "Reverted Phosphoric Acid" is dissolved by citrate of ammonia. The latter is about as valuable as the former and the two taken together make up the "Available Phosphoric Acid."

"Insoluble Phosphoric Acid" is that which remains undissolved after treating the fertilizer with water and citrate of ammonia. It may be dissolved by a strong acid.

"Total Phosphoric Acid" is the sum of the "Soluble," "Reverted" and "Insoluble" Phosphoric Acid.

"Potash" is the metal potassium combined with oxygen. It is never used alone, but always in combination with some acid. The value of these compounds depend on the amount of actual potash contained in them.

"Ammonia" is a compound of the gas nitrogen with another gas, hydrogen. The compound is an invisible gas with a very pungent odor —the odor of ordinary ammonia water or "spirits of hartshorn," which is a solution of this gas in water. In combination with sulphuric acid it forms ammonia sulphate, an odorless solid, which is a valuable fertilizer.

The element nitrogen, when in combination in vegetable, animal or mineral matter (nitrates), may be readily converted into ammonia. Such

substances are used much more frequently in fertilizers than ammonium sulphate. Sometimes the analysis of a fertilizer states the percentage of nitrogen. The usual practice in this State, however, is to give its equivalent in ammonia. Fourteen parts of nitrogen are equivalent to, or will make, seventeen parts of ammonia.

SOURCE OF FERTILIZER INGREDIENTS.

South Carolina Rock furnishes more phosphoric acid than all other sources combined. The rock is ground very fine by steam power and then treated with sulphuric acid (oil of vitriol) to render the phosphoric acid soluble. About 1600 lbs. of the acid, as it comes from the factory, are required for a ton of the ground rock. The acid combines with about two-thirds of the lime present, forming sulphate of lime or "plaster," so that a ton of *dissolved* S. C. rock contains 700 to 800 lbs. of plaster, which has been formed in the process of dissolving the rock. This plaster is sometimes removed, leaving a fertilizer very rich in phosphoric acid —the so called "double superphosphate." The plaster is either sold under the name of "Phospho-Plaster," or used as a filler for other fertilizers. Dissolved S. C. Rock is used in making nearly all mixed fertilizers.

Bone contains phosphoric acid as well as nitrogen (ammonia). It is used either as raw, or steamed, ground bone or is dissolved by treating it with sulphuric acid.

Potash comes principally from the German potash mines where there are immense deposits of potash compounds, which are mined like coal. The supply in this country is controlled by a syndicate. A list of potash compounds is given below.

Ammonia is furnished in sulphate of ammonia, which is derived from gas works; in Chili saltpetre (nitrate of soda), a mineral from South America; in dried blood, tankage, azotin, etc., which are dried by-products from slaughter houses; in cotton seed meal and similar substances.

MIXED FERTILIZERS.

By mixing two or more of the above ingredients a mixed fertilizer is obtained. The ingredients are ground, if necessary, before mixing. Other materials than those mentioned are sometimes used. A fertilizer containing phosphoric acid, potash and nitrogen (ammonia) is called a complete fertilizer.

GUARANTEE.

The law requires an analysis of all fertilizers to be stamped on the bags in which they are contained. This analysis should give the minimum and *only* the minimum per cent of the essential ingredients contained therein. Many manufacturers still continue to give a maximum as well as the minimum guarantee. If prosecuted, the penalty for this is $100 fine for the first offence.

Here are three methods of giving the guaranteed analysis of the same fertilizer as stamped on the bag by different manufacturers. No. 1 is the simplest, No. 2 is more complex and a common form, while No. 3 is an extreme case:—

No. 1.	Available Phosphoric Acid,	8 per cent.
	Potash,	2 "
	Ammonia,	1 "
No. 2.	Available Phosphoric Acid,	8 to 10 per cent.
	Insoluble "	1 to 2 "
	Total Phosphoric Acid,	9 to 12 "
	Potash,	2 to 3 "
	Ammonia,	1 to 2 "
No. 3.	Soluble Phosphoric Acid,	6 to 8 per cent.
	Equal to Bone Phosphate,	13 to 18 "
	Reverted Phosphoric Acid,	2 to 3 "
	Equal to Bone Phosphate,	4 to 7 "
	Available Phosphoric Acid,	7 to 11 "
	Equal to Bone Phosphate,	17 to 24 "
	Total Phosphoric Acid,	9 to 12 "
	Equal to Bone Phosphate,	20 to 26 "
	Sulphate of Potash,	4 to 6 "
	Potash,	2 to 3 "
	Sulphate of Ammonia,	4 to 8 "
	Ammonia,	1 to 2 "

The analysis No. 3 certainly looks big, but it would be advisable to buy No. 1, for, if we are to judge of the fertilizer by the guarantee, the chances are that it has less "filler" in it.

The purchaser of fertilizer should see to it that the guarantee gives the content of *available* phosphoric acid (this does not apply to ground bone). Some manufacturers are using simply the term "phosphoric acid," meaning and giving available phosphoric acid, while some others allow the consumer to believe that he is getting the latter, while they palm off on him comparatively worthless *insoluble* phosphoric acid, and if any question arises in regard to it, they claim that *insoluble* phosphoric acid "fills the bill."

The purchaser should also see that "Potash" and "Ammonia" are guaranteed and not "sulphate of potash" or "sulphate of ammonia." There would be no objection, however, to a statement that the potash is derived from sulphate of potash, as this form is commercially more valuable than other forms of potash.

PRICES.

The only change now made in the schedule of valuations is from six cents to five cents per pound for available phosphoric acid in Dissolved S. C. Rock. This change was deemed necessary in view of the fact that this article has been sold at a very low figure the past season, as a rule. At least one firm (The Maryland Grange Agency) has sold it for $9.50 per ton delivered on cars in Baltimore.

Ammonia is also considerably cheaper than at the time of making out the schedule. It is not thought desirable to change the schedule, however. It is not possible to follow the fluctuations of the market. The prices of fertilizer ingredients are given in the principal daily and

weekly papers with other market quotations, so that anyone can easily keep posted if he so desires, if he will only remember that the price per "unit," or price for each per cent, on the ton basis, is the price of twenty pounds of the ingredient quoted. For example: If dried blood is quoted at $2.25 per unit of ammonia, then ammonia is worth 11¼ cents per pound; and further, that Dissolved S. C. Rock contains about 13 per cent available phosphoric acid, nitrate of soda contains the equivalent of 19 per cent ammonia. Sulphate and muriate of potash contains about 50 per cent and Kainit 12 per cent of actual potash. The German Kali Syndicate publish the following price list of potash salts for 1895. The prices are for the material in bags delivered on board cars in Baltimore. The price per pound of actual potash is added:—

	Approximate per cent of Potash, K_2O.	Price per Ton for less than			Price per pound for Potash K_2O, in lots less than		
		25 tons	12 tons	1 ton.	25 tons	12 tons	1 ton.
					Cts.	Cts.	Cts.
Muriate of Potash, 80 to 85 per cent Muriate.....	50 per cent.	$41.50	$47.00	$51.50	4 15/100	4 70/100	5 15/100
Sulphate of Potash, 90 to 95 per cent Sulph. of Potash...	50 per cent.	48.50	54.58	59.50	4 85/100	5 45/100	5 95/100
Double Manure Salt, 48 to 53 per cent Sulph. of Potash...	27 per cent.	26.50	29.50	32.50	4 91/100	5 46/100	6 2/100
Kainit.....	12 per cent.	11.00	12.00	13.00	4 58/100	5	5 42/100

STATEMENT OF ANALYSIS.

The analyses as given in the following tables are given in per cent, or pounds in a hundred. For example, the number 1.50 in the column headed "ammonia found" means that the fertilizer named in the line was found by analysis to contain one-and-half pounds of ammonia in each 100 pounds of the fertilizer.

THE VALUATION OF FERTILIZERS.

The last two columns of the table give, side by side, the "comparative value found," or calculated from the analysis made in the College laboratory, and the "comparative value guaranteed" i. e. the value calculated from the guaranteed analysis as stamped on the bags, using the same standards as before. This shows at a glance whether the fertilizer is more or less valuable than guaranteed. It does not show, however, variations due to irregular mixing, when a deficit of one ingredient is balanced by a corresponding excess of another.

The standards of valuation in use for the current year are as follows:

In Mixed Fertilizer:	
For Nitrogen calculated as Ammonia	20 cts. per pound.
" Potash (K_2O)	6 " " "
" Available Phosphoric Acid	6 " " "
" Insoluble Phosphoric Acid	3 " " "
" " " " when from S. C. Rock	2 " " "
In Dissolved S. C. Rock:	
Available Phosphoric Acid	5 " " "
In Ground Bone:	
For Nitrogen, calculated as Ammonia, in "Fine" Bone	14 " " "
" Nitrogen, calculated as Ammonia, in "Fine-Medium" Bone	12 " " "
" Nitrogen, calculated as Ammonia, in "Medium" Bone	10 " " "
" Nitrogen, calculated as Ammonia, in "Coarse" Bone	8 " " "
" Phosphoric Acid in "Fine" Bone	5 " " "
" " " " "Fine-Medium" Bone	4 " " "
" " " " "Medium" "	3 " " "
" " " " "Coarse" "	2 " " "

The "comparative values *found*" by using these figures are not intended to represent the proper selling prices of fertilizers at the place of sale or use. The rates used are the wholesale prices at which a pound of phosphoric acid, potash and ammonia can now be purchased in their various forms for cash, in our large markets, *plus 20 to 40 per cent.* This, it is thought, *is sufficient to cover the cost* of mixing and bagging. The freight rate from Baltimore should be added when comparing prices in other parts of the State.

Ground bone is sifted into four successive grades of fineness, as follows:

Less than 1-50 inch, "Fine."
Less than 1-25 inch, "Fine Medium."
Less than 1-12 inch, "Medium."
Over 1-12 inch, "Coarse."

The results are given in the table marked "mechanical analysis of ground bone." Each grade has its own valuation assigned for both phosphoric acid and ammonia as given above. The agricultural value of bone depends largely on its mechanical condition. The chemical composition of the different grades of fineness in the same sample is assumed to be the same. The variations is small in a pure ground bone.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling
1378	Alexandria Fert. & Chem. Co., Alexandria, Va.	Dissolved S. C. Bone.	Hancock
1286	A. Anstine, Stewartstown, Pa.	Bone Phosphate	Cockeysville
1287	" "	Pure Ground Bone	Cockeysville
1636	Baltimore Guano Co., Baltimore, Md.	B. G. Ammoniated Bone Phosphate	Baltimore
1629	" " "	Eagle Phosphate	Baltimore
1627	" " "	Farmers' Alkaline Bone	Baltimore
1628	" " "	Farmers' Dissolved Bone	Baltimore
1676	" " "	Farmers' Dissolved Bone	Hurlock
1680	" " "	Farmers' Dissolved Bone	Hurlock
1291	Baugh & Sons Co., Baltimore, Md.	Ammoniated Dissolved Animal Bones	Corbett
1235	" " "	Bone Meal	Gaithersburg
1246	" " "	Crop Grower	North East
1415	" " "	Day's Ammoniated Bone Phosphate	Baltimore
1227	" " "	Dissolved Animal Bone	Rockville
1236	" " "	Double Eagle Phosphate	Gaithersburg
1225	" " "	Export Bone with Pot ash	Laurel
1660	" " "	Fish Mixture	Baltimore
1237	" " "	Genuine German Kainit	Gaithersburg
1224	" " "	H. G Acid Phosphate or Dissolved S. C. Rock	Laurel
6105	" " "	New Process Dissolved Bone	Ellicott City
1226	" " "	Potato Fertilizer	Laurel

Maryland Agricultural College, September, 1894, to January, 1895.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed	Found.	Guaranteed.		
1378	.....	.....	....	.....	0.64	13.78	13	14.42	14	$13.78	$ 13.00
1286	2.56	2–3	2.20	1–2	3.84	9.62	*20–25	13.46	.....	26.66	{ 20.20 / 28.15
1287	4.82	.....	.....	.....	.....	.....	.....	19.77	.....	23.74	
1636	1.41	1½–2½	1.41	2–3	1.75	9.95	8–10	11.70	10–13	20.32	{ 19.20 / 27.40
1629	0.67	½–1½	1.22	1–2	2.44	9.88	10–12	12.32	11–14	17.46	{ 15.80 / 24.00
1627	...	... ...	1.20	2–3	2.41	11.91	10–12	14.32	12–14	14.31	{ 13.20 / 16.40
1628	.....	.....	....	... .	2.36	14.16	14–16	16.52	15–18	14.16	{ 14.00 / 16.00
1676	.....	.....	.....	.....	3.59	12.30	14–16	15.89	15–18	12.30	{ 14.00 / 16.00
1680	....	.....	.....	.. ...	2.74	14.66	14–16	17.40	15–18	14.66	{ 14.00 / 16.00
1291	2.48	2–3	. ..	.....	3.21	10.27	9–10	13.48	12–13	24.17	{ 20.00 / 25.80
1235	4.73	4	.....		...	....	.....	23.66	21½	30.95	
1246	1.45	1	1.15	1	2.83	9.40	8	12.23	.....	20.15	14.80
1415	2.18	2–2½	2.81	2–3	2.47	8.32	8–10	10.79	.....	23.55	{ 20.00 / 25.60
1227	4.08	3	.. .	... ..	8.03	12.13	11	20.16	16	35.70	28.20
1236	2.87	2½	....	.....	3.54	9.20	8	12.74	*17	24.64	21.40
1225	3.03	2–3	2.52	2–3	8.45	4.87	11–12	13.32	.....	26.05	{ 23.60 / 30.00
1660	2.45	2–2½	2.76	2–2½	2.23	7.56	8–10	9.79	*20–22	23.52	{ 20.60 / 25.60
1237	....	.....	12.59	12	.....	...	.....	.....	.....	15.11	14.40
1224	....	.....	.....	...	0.88	14.55	13½	15.43	15	14.55	13.50
1605	2.79	2½–3	.....	.....	4.19	8.24	*15–17	12.43	*22–27	23.56	{ 20.20 / 24.00
1226	1.71	2–2½	1.23	2–2½	1.94	11.64	8–9	13.58	.....	23.45	{ 23.00 / 27.40

*Bone Phosphate. Divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1656	Baugh & Sons Co., Baltimore, Md.	Soluble Alkaline Super Phosphate	Baltimore
1247	" " "	Wheat Fertilizer for Wheat and Grass	North East
1590	Beck & Walker, Chestertown, Md.	Propagator	Chestertown
1589	" " "	Trustworthy	Chestertown
1588	" " "	Try Me Soluble Bone and Potash	Chestertown
1454	James Bonday, Jr., & Co., Baltimore. Md	Old Reliable Dissolved S. C. Bone	Baltimore
1621	S. B Brodbeck, Brodbecks, Pa.	Standard Ammoniated Phosphate	Baltimore
1484	John Bullock & Son, Baltimore, Md.	Dissolved Pure Raw Bone	Sykesville
1639	" " " "	Pure Ground Raw Bone	Baltimore
1401	Chemical Co., of Canton, Baltimore, Md.	Baker's Special Wheat and Grass Mixture	Gaithersburg
1476	" " "	Dissolved Bone Phosphate	Ellicott City
1475	" " "	Fine Grouud Animal Bone	Ellicott City
1603	" " "	Pure Dissolved S. C. Bone	Ellicott City
1514	" " "	Soluble Alkaline Bone	Monrovia
1477	" " "	Special Wheat Mixture	Ellicott City
1671	Chesapeake Guano Co., Baltimore, Md.	Acid Phosphate	Fountain Mills
1634	" " "	Alkaline Dissolved Bone	Baltimore
1552	" " "	Ammoniated Alkaline Guano	College
1281	" " "	Ammoniated Alkaline Phosphate	Bel Air
1492	" " "	Ammoniated Bone Super Phosphate	Mt. Airy
1630	" " "	Bone and Potash	Baltimore

Maryland Agricultural College, September, 1894, to January, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1656	.....		1.92	2	1.42	10.64	10.	12.06	.....	$13.50	$ 12.40
1247	2.13	2	2.10	2	3.19	8.08	8	11.27	11	22.65	20.00
1590	1.12	1	1.96	2	0.44	10.40	10	10.84	.....	19.57	18.40
1589	1.66	1½	2.79	2	0.22	11.21	10.	11.43	.....	23.57	19.20
1588	.....		3.38	3	2.24	10.11	10	12.35	.....	15.07	14.20
1454	.....	.....	.....		1.77	13.95	14–16	15.72	.....	13.95	14.00 to 16.00
1621	1.97	2–3	1.81	2–3	1.59	9.43	9–10	11.02	.....	22.32	21.20 to 27.60
1484	2.98	3.67	.....		3.56	12.27	12.30	15.83	.....	27.58	29.44
1639	4.32	4.92	.....		.....	.....		23.60	25.20	27.64	....
1401	1.53	1–2	2.63	2–3	2.62	8.59	9–11	11.21	11–13	21.16	18.40 to 26.00
1476	0.06	¼–½	.....		2.07	13.39	13–15	15.46	15–17	13.39	17.80 to 21.20
1475	2.19	3–4	.....		12.50	8.80	....	21.30	23–27	26.82	25.80 to 32.20
1603	.....	.....	.....		2.06	13.81	13	15.87	15	13.81	13.00
1514	.....		2.51	2½–3½	1.91	11.00	12–14	12.91	14–16	14.77	15.80 to 19.00
1477	2.77	1–2	0.16	2–3	13.33	6.63	9–11	19.96	11–13	27.23	18.40 to 26.00
1671	.....	.....	.....		2.92	13.58	13	16.50	15	13.58	13.00
1634	.....		3.04	2½–3	0.85	13.54	10–13	14.39	12–15	17.53	13.80 to 17.80
1552	2.46	2	2.40	1	2.36	8.30	8	10.66	.....	24.10	18.80
1281	2.36	.....	1.46	2	1.78	8.13	8	9.91	11	22.02	11.60
1492	1.90	1.84	1.68	1.44	1.66	9.38	9.	11.04	12	21.88	21.18
1630	.....		3.18	2½	1.39	13.14	10	14.53	12	17.52	13.80

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1282	Chesapeake Guano Co., Baltimore, Md.	Chesapeake Guano	Bel Air
1669	" "	Dissolved Bone Phosphate	Easton
1611	" " "	Dissolved Bone Phosphate	Mt. Airy
1610	" " "	Gem Soluble Bone	Mt. Airy
1489	" " "	Monogram Ammoniated Bone	Mt. Airy
1599	R. L. Christie & Co., Baltimore, Md.	Wheat and Grass Special	Calvert
1429	E. A. Clendenin & Bro., Colora, Md.	Acid Phosphate	Baltimore
1251	" " "	F. F. V. Farmers' Favorite Vegetator	North East
1248	" " "	N. S. National Standard Phosphate	North East
1250	" " "	Pure Dissolved Bone	North East
1249	" " "	Pure Ground Bone	North East
1433	" " "	Waring's T. & P. Tried and Proved Sup. Phos.	Baltimore
1374	E. P. Cohill, Hancock, Md.	Animal Bone Meal	Hancock
1253	J. A. Cranston & Co., Newport, Del.	Pure Ground Raw Bone	North East
1289	Crocker Fertilizer & Chemical Co., Buffalo, N. Y.	Ammoniated Practical Super Phosphate	Parkton
1601	" " "	Ammoniated Practical Super Phosphate	Walkersville
1600	" " "	Niagara Phosphate	Walkersville
1494	Cutshall & Lough, Woodsboro, Md.	Ammoniated Bone Phosphate	Mt. Airy
1270	Wm. Davison & Co., Baltimore, Md.	"Bos" Ammoniated Super Phosphate	Bel Air
1641	" " "	Dissolved S. C. Bone	Baltimore
1273	" " "	High Grade Ammoniated Super Phosphate	Bel Air

Maryland Agricultural College September, 1894, to January, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1282	2.70	2–2½‡	1.41	¾–1	1.72	9.09	9–11	10.81	12–14	$24.43	$20.90 to 26.20
1669	.....	.....	.....		2.25	14.63	14	16.88	.....	14.63	14.00
1611	.....	.....	.....		1.88	14.22	14	16.10	15	14.22	14.00
1610	.....	.....	.....		0.62	14.69	13–15	15.31	15–17	14.69	13.00 to 15.00
1489	1.57	1	1.35	1	2.20	8.00	8	10.20	*22	18.82	16.00
1599	2.28	2–3	2.61	2–3	1.34	9.34	10–12	10.68	13–16	24.26	24.20 to 32.40
1429	.....	.....	.....		1.54	13.01	13–16	14.55	.....	13.01	13.00 to 16.00
1251	1.40	1–1½	2.41	† 1–2	2.15	9.85	6–8	12.00	7–10	21.60	12.45 to 18.00
1248	1.95	1½–2½	1.81	1½–2½	2.64	11.46	10–12	14.10	13–17	25.30	21.60 to 30.40
1250	2.59	2–3	.....	.....	5.25	10.46	14–15	15.71	33–39*	26.06	25.40 to 31.80
1249	4.72	4–5	.....	.....	.....	.....	.....	21.82	48–55*	25.46	
1433	.....	.....	.....	.....	1.53	13.26	13–16	14.79	.....	13.26	13.00 to 16.00
1374	4.68	4.67	.....	.....	14.25	6.35	11.51	20.60	21.91	34.89	38.74
1253	4.59	4–5	.....	.....	.....	.....	.....	19.75	19–24	24.93	
1289	1.34	1–2	1.21	1–2	2.25	8.59	8–10	10.84	*18–22	18.46	15.40 to 23.60
1601	1.60	1–2	1.88	1–2	2.61	9.43	8–10	12.04	9–12	21.55	15.40 to 23.60
1600	.....	.....	.....	.....	1.12	13.54	11½–13	14.66	12½–16	13.54	11.50 to 13.00
1494	1.61	1	1.25	1	1.65	8.26	8	9.91	.....	18.84	14.80
1270	2.74	2½	3.39	2½	5.44	8.54	8	13.98	11	28.53	24.40
1641	.....	.....	.....	.....	3.54	13.09	13.	16.63	16	13.09	13.00
1273	2.80	2¾	2.86	2¾	4.32	11.88	10	16.20	13	31.47	28.10

*Bone Phosphate. Divide by 2.18 to reduce to Phosphoric Acid.
†Sulphate of Potash. Divide by 1.85 to reduce to Potash, K_2O.
‡Nitrogen. Equal to 2.42 to 3.30 per cent Ammonia.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1271	Wm. Davison & Co., Baltimore. Md.	Pen-Mar Bone Phosphate	Bel Air.
1519	E. E. DeLashmutt, Frederick, Md.	Dissolved S. C. Bone	Frederick
1518	" " "	Standard Super Phosphate of Lime	Monrovia
1521	" " "	Half and Half Ammoniated Bone Phosphate	Frederick
1564	L. E. P. Dennis & Son, Crisfield, Md.	Fish and Potash Mixture No 1	Crisfield
1565	" " " "	Fish and Potash Mixture No. 2	Crisfield
1563	" " " "	Special Strawberry Mixture	Crisfield
1633	Detrick Fertilizer & Chemical Co., Baltimore, Md.	Ammoniated Bone Phosphate	Baltimore
1386	" " "	Bone Phosphate and Potash Fertilizer	Cumberland
1385	" " "	Dissolved S. C. Bone	Cumberland
1576	" " "	Enterprise Phosphate	Centreville
1403	" " "	Farmers' New Method	Silver Spring
1402	" " "	Mason's No. 4	Silver Spring
1406	" " "	Potato Fertilizer	Silver Spring
1404	" " "	Pure Fine Ground Raw Bone	Silver Spring
1471	" " "	Special Wheat Mixture	Laurel
1407	" " "	Vegetable Compound	Silver Spring
1478	" " "	W. D. Wheat Compound	Ellicott City
1221	J. W. Dorsey, Ellicott City, Md.	Mixture D	Ellicott City
1617	Dudley & Carpenter, Baltimore, Md.	Ammoniated Bone Phosphate	Baltimore
1553	" " "	Dissolved S. C. Rock	College

Maryland Agricultural College, September, 1894, to January, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1271	1.85	1.4	3.31	2½	4.78	8.18	8	12.96	10	$24.06	$ 19.40
1519	.....	.....	.....	.....	1.41	12.35	14.	13.84	.....	12.35	14.00
1518	0.96	2.	0.25	2	2.56	12.00	10.	14.56	.....	20.08	22.40
1521	0.24	1½	0.17	1½	2.31	13.84	10.	16.15	.....	19.16	19.80
1564	2.98	3½	3.29	3½	2.33	7.98	7	10.31	.....	26.84	26.60
1565	2.64	2	2.33	2	1.90	6.52	6	8.42	.....	22.31	17.60
1563	3.49	3½–4	6.23	7–8	3.60	8.31	10–11	11.01	.....	33.56	{ 28.40 / 32.20
1633	2.05	1½	1.24	1.	6.72	9.39	9.	16.11	11	24.87	19.20
1386	.....	.....	1.90	2.	1.63	12.80	10.	14.43	12.	15.73	13.20
1385	.....	.....	.....	.....	1.16	14.96	14.	16.12	15½	14.96	14.00
1576	0.79	½–1	1.85	2–4	2.79	9.80	9–12	12.59	10–14	18.81	{ 15.80 / 24.40
1403	2.56	2½	.....	.....	2.42	11.37	8.	13.79	.....	25.33	19.60
1402	2.44	2½	1.28	1.	4.40	8.97	9.	13.37	.....	24.84	22.00
1406	2.60	2½	3.72	4.	2.64	10.90	8.	13.54	9½	29.52	25.30
1404	4.47	4½	.....	.....	.....	.....	.....	21.99	23.	30.52	.....
1471	1.25	1.	1.16	1.	4.89	7.54	8.	12.43	22*	18.38	16.00
1407	7.15	7.	4.23	4.	1.79	7.56	7.	9.35	9.	43.82	42.40
1478	2.53	2½	1.29	1.	4.70	8.01	8.	12.71	.....	24.10	20.80
1221	2.63	2½	2.37	2½	3.54	8.80	8.	12.34	13.	26.04	25.60
1617	2.55	2½–3	1.94	2–2½	4.10	7.81	10–11	11.91	12–14	24.36	{ 25.60 / 30.00
1553	.....	.....	.....	.....	1.51	15.52	14.	17.03	.....	15.52	14.00

*Bone Phosphate. Divided by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name add Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1616	Dudley & Carpentar, Baltimore, Md.	Special Wheat Mixture	Baltimore
1595	T. W. Eliason, Chestertown, Md.	Chester Compound	Chestertown
1596	" " "	Bone Fertilizer, Home Improved	Chestertown
1594	" " "	No. 1, Ammoniated Super Phosphate	Chestertown
1584	Emory & Burgess, Centreville, Md.	Emory's Bone and Potash	Centreville
1586	" " "	Pure Diamond Bone Phosphate	Centreville
1585	" " "	Special Formula	Centreville
1348	Englar & Rinehart, Linwood, Md.	Linwood's Favorite	Linwood
1346	" " " "	No 1, Ammoniated Bone Phosphate	Linwood
1347	" " " "	No. 2 Ammoniated Bone Phosphate	Linwood
1259	Eureka Fertilizer Co., Perryville, Md.	Alkaline Bone and Potash	Perryville
1257	" " "	Bone Meal	Perryville
1256	" " "	Farmers' Favorite Bone Phosphate	Perryville
1265	" " "	Imperial Bone Phosphate	Rising Sun
1254	" " "	Peerless Bone	Leslie
1255	" " "	P. & P. Super Phosphate	Leslie
1267	" " "	Pure Dissolved Animal Bone	Rising Sun
1258	" " "	Pure Fine Ground Bone	Perryville
1266	" " "	Raw Bone Phosphate	Rising Sun
1336	Farmers' Fertilizer Co., Westminster, Md.	No. 1, Bone Phosphate	Westminster
1337	" " "	No. 2, Bone Phosphate	Westminster

Maryland Agricultural College, September, 1894, to January, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1616	....	.....	2.55	2½†	1.90	12.68	12.	14.58	13½	$16.50	$ 14.16
1595	3.07	2.	2.21	1½	1.17	10.10	9.	11.27	11½	27.75	22.10
1596	.....	.....	1.91	3½–4	1.96	10.13	6–8	12.09	....	13.19	{ 10.20 / 12.80
1594	2.65	1½	1.93	1	0.98	10.06	9.	10.98	11½	25.54	19.50
1584	.....		3.46	1½	0.70	13.02	12.	13.72	28*	17.45	14.20
1586	0.97	2§	1.39	3.†	4.54	10.20	9.	14.74	22*	20.47	15.92
1585	.....		1.42	1½	1.41	12.97	12	14.38	28*	15.23	14.20
1348	1.27	1	1.34	2.37	2.00	11.03	7.93	13.03	9.02	21.13	17.01
1346	2.00	2½	1.31	1.24	4.15	10.10	11.31	14.25	.....	24.18	25.17
1347	0.88	1.80	2.21	1.83	1.38	10.53	11.99	11.91	.....	19.64	23.80
1259	.....	.....	1.02	2–3	4.12	11.77	11–13	15.89	12–15	14.64	{ 13.80 / 17.40
1257	2.73	3–4	.....		....		.....	27.24	22–25	30.70	.....
1256	2.11	2–3	1.54	2–3	5.19	8.41	10–12	13.73	12–15	23.48	{ 22.40 / 30.09
1265	1.33	1–2	1.65	1–2	4.48	9.82	9–11	14.30	10–13	21.77	{ 16.00 / 23.60
1254	2.77	2½–3	.....	.....	11.55	9.36	.. ....	20.91	18–20	29.24	{ 20.80 / 24.00
1255	.....		.....		3.06	12.50	13–15	15.56	15–18	12.50	{ 13.00 / 15.00
1267	1.54	2.–3	.....		7.50	13.35	12–14	20.85	15–18	26.68	{ 24.20 / 31.20
1258	3.35	4–5	.....		.....		.....	22.29	22–25	25.64	.....
1266	1.88	2–3	1.35	2–4	4.84	9.46	10–12	14.30	13–16	23.39	{ 22.40 / 31.20
1336	1.66	2¼	2.48	2½	2.21	9.63	9.	11.84	11.	22.51	24.00
1337	.50	1¾	2.74	2¼	2.32	9.52	9.	11.84	10.	22.10	21.10

†Sulphate of Potash. Divide by 1.85 to reduce to Potash.
*Bone Phosphate. Divide by 2.18 to reduce to Phosphoric Acid.
§Ammonia Sulphate. Divide by 3.88 to reduce to Ammonia.

Table of Analysis and Valuation of Fertilizers Made at the

NO.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1338	Farmers' Fertilizer Company, Westminster, Md	No. 3, Bone Phosphate	Westminster.
1339	" " "	XX Bone Phosphate	Westminster
1658	Farmers' and Planters' Agency, Baltimore, Md.	Farmers' and Planters' Ammoniated Bone	Baltimore
1523	W. S. Farmer & Company, Baltimore, Md.	Clyde Brand	Frederick
1280	" " "	Ground Bone	Bel Air
1302	" " "	Harvest Queen	Baltimore
1414	" " "	Pure Bone Meal	Baltimore
1467	" " "	Dissolved S. C. Bone	Bucktown
1279	" " "	Special Tomato & Wheat Guano	Bel Air
1413	" " "	Standard Phosphate	Baltimore
1582	Feddeman & Earle, Centreville, Md.	Farmers' Friend Mixture	Centreville
1274	Edward Ferry, Bel Air, Md.	Harford Guano	Bel Air
1437	Frederick Elevator Com'y, Frederick, Md.	Farmers' Friend	Baltimore
1399	Gaithersburg Milling and Mfg. Co., Gaithb'g, Md.	Acid Phosphate	Gaithersburg
1328	N. I. Gorsuch & Son, Westminster, Md.	No. 3, Bone XXXX	Westminster
1327	" " "	Westminster Alkaline Bone Phosphate	Westminster
1450	" " "	Westminster Dissolved, Raw Bone Phosphate	Baltimore
1352	Griffith & Boyd, Baltimore, Md.	Ammoniated Soluble Bone	Union Bridge
1329	" " "	Genuine German Kainit	Westminster
1354	" " "	High Grade Acid Phosphate	Union Bridge
1353	" " "	Pure Dissolved Animal Bone	Union Bridge

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NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Camparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1338	1.62	2.	2.73	2¾–3¾	1.77	9.66	8–9	11.43	9–11	$22.41	$21.50 to 24.50
1339	0.70	1.	2.87	3.	2.44	8.92	8.	11.36	9.	18.40	17.80
1658	2.34	3.	2.45	2.	1.98	9.48	7.	11.46	.....	24.87	22.80
1523	1.18	1.	2.45	2½	1.92	9.58	9.	11.50	22*	20.31	18.40
1280	3.04	3.	.....	.....	12.83	5.02	.....	17.85	15.	25.88	21.00
1302	1.55	1½	2.91	2½	1.18	9.20	10.	10.38	11½	21.44	21.90
1414	4.50	4	.....	.....	.....	.....	.....	22.51	23.	32.03	.....
1467	.....	.....	.....	.....	1.91	14.35	14.	16.26	15½	14.35	14.00
1279	3.40	3.	2.35	2	4.69	7.26	6.	11.95	7.	27.94	21.60
1413	2.83	2.85	2.76	2½	1.49	9.69	10.	11.18	11½	27.15	27.30
1582	.....	.....	.....	.....	1.53	15.13	14.	16.66	32*	15.13	14.00
1274	1.65	1½–2½	2.79	2½–3½	1.71	9.00	10–11	10.71	11½–13½	21.78	21.90 to 28.90
1437	1.52	1.	1.00	1.	3.88	8.91	8.	12.79	10	20.30	16.00
1399	.....	.....	.....	.....	0.59	13.66	13–15	14.25	14–17	13.66	13.00 to 15.00
1328	.....	‡	1.79	1½	1.08	8.40	8.	9.48	18*	10.98	10.20
1327	.....	.....	.....	.....	1.74	12.91	13.	14.65	30*	12.91	13.00
1450	1.89	1.40	2.73	2¼	2.52	7.16	7.	9.68	18*	20.93	17.30
1352	1.29	1.	1.82	1½	2.45	7.72	7.	10.17	8.	18.07	14.80
1329	.....	.....	12.26	23†	.....	.....	.....	.....	.....	14.71	14.70
1354	.....	.....	.....	.....	0.92	13.43	13.	14.35	14.	13.43	13.00
1353	2.79	2½	.....	.....	3.12	11.23	10.	14.35	12.	26.51	23.20

*Bone Phosphate. Divide by 2.18 to reduce to Phosphoric Acid.
†Sulphate of Potash. Divide by 1.85 to reduce to Potash.
‡Traces.

Table of Analysis and Valuation of Fertilizers Made at the

NO.	Name and Address of Manufacturer.	Name of Fertilizers.	Place of Sampling.
1330	Griffith & Boyd, Baltimore, Md.	Valley Fertilizer	Westminster
1550	Griffith, Turner & Co., Baltimore, Md.	Acid Phosphate	Brookville
1500	" " "	Ammoniated Butchers' Bone Phosphate	Hoods Mills
1549	" " "	Ground Bone	Brookville
1551	" " "	Kainit	Brookville
1648	" " "	Pure Dissolved Animal Bone	Baltimore
1646	Wm. R. Griffith, Baltimore, Md.	Slaughter House Phosphate	Baltimore
1580	J. Hershey Hall, Centreville, Md.	C. C. C. Ammoniated Phosphate	Centreville
1501	Hammond Bros., Hoods Mills, Md.	Special Mixture	Hoods Mills
1294	J. Horner, Jr., & Co., Baltimore, Md.	Ammoniated Raw Bone Super Phosphate	Glencoe
1651	" " "	Dissolved Slaughter House Bone Dust	Taylor
1260	" " "	Slaughter House Bone Dust	Lapidum
1316	Hubbard & Co., Baltimore, Md.	Crescent Soluble Crop Grower	Baltimore
1672	" " "	Dissolved Raw Bone	Plane No. 4
1609	" " "	High Grade Soluble S. C. Phosphate	Sykesville
1612	" " "	Oriental Phosphate for Wheat and Grass	Mt. Airy
1666	" " "	Pure Raw Bone	Baltimore
1667	" " "	Pure Raw Bone	Baltimore
1673	" " "	Soluble Bone and Potash	Plane No. 4
1614	" " "	Standard Bone Phosphate	Mt. Airy
1674	" " "	Wheat Grower's Jewel	Plane No. 4

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NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1330	.....	‡	1.95	2.	1.05	8.35	9.	9.40	10.	$12.99	$ 11.80
1550	.....	.....	.....	.....	1.23	13.06	13.	14.29	14.	13.06	13.00
1500	1.80	1½	1.85	1½	1.68	9.53	9.	11.21	10.	21.87	19.20
1549	4.83	4	....	.....	.....	....	.....	22.35	45*	28.30	.....
1551	.....	.....	12.62	.....	.....	.....	.....	....	.....	15.14	.....
1648	2.67	3.	.....	.....	2.47	11.47	11.	13.94	12½	25.92	26.10
1646	2.21	2.	2.29	2¼	2.56	8.45	5.	11.01	10½	23.27	19.70
1580	1.59	1.	2.79	2.	2.11	11.05	10.	13.16	.....	24.24	18.40
1501	1.31	1–2	1.34	1–2	2.34	8.40	8–10	10.74	10–13	18.33	16.00 24.20
1294	2.67	2½	2.93	2½	2.00	8.95	7.	10.95	25*	26.14	23.80
1651	2.78	2½	.....	.....	4.20	13.88	12.	18.08	15.	30.30	26.20
1260	6.67	6.	.....	.....	.....	....	.....	20.35	20.	31.34	.....
1316	.....	.....	.....	.....	1.66	9.74	10.	11.40	11.	9.74	10.00
1672	2.75	2¾	.....	.....	2.82	10.86	11.	13.68	23*	25.72	25.40
1609	.....	.....	.....	.....	1.11	15.10	14.	16.21	28*	15.10	14.00
1612	1.15	1.	1.65	1½	1.12	8.65	8.	9.77	22*	18.63	16.60
1666	4.80	4–5	.....	.....	.....	....	.....	23.56	50–55*	32.28	.....
1667	4.97	4–5	.....	.....	.....	.....	.....	23.57	55–60*	31.86	.....
1673	.....	.....	1.63	1½	0.92	10.47	10.	11.39	11½	12.80	12.40
1614	2.26	2–3	2.07	2–3	1.79	10.82	9–11	12.61	24.–30*	25.57	21.80 30.00
1674	1.78	1½	1.41	1½	1.21	11.11	10.	12.32	26*	22.87	20.40

‡Traces.
*Bone Phosphate. Divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuations of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1635	M. P. Hubbard & Co., Baltimore, Md.	Ammoniated Bone and Potash Phosphate	Baltimore
1223	" " " "	Celebrated Bone Super Phosphate	Jessups
1466	" " " "	Harvest King	Baltimore
1604	" " " "	High Grade Soluble S. C. Phosphate	Ellicott City
1625	" " " "	Farmers' Old Economy	Baltimore
1592	T. R. Hubbard & Son, Chestertown, Md.	Imperial Compound	Chestertown.
1593	" " "	Our A. A. Super Phosphate	Chestertown
1591	" " "	Victor Phosphate	Chestertown
1561	Humphreys & Tilghman, Salisbury, Md.	Our Mixture B	Salisbury
1398	James River M. & P. Co, Richmond, Va.	Natural Plant Food	Oakland
1283	H. H. & W. E. Klinefelter, Havre de Grace, Md.	Ammoniated Bone Phosphate	Fallston
1643	" " " "	Lanvale Soluble Bone	Baltimore
1638	" " " "	Roland Ammoniated Bone Phosphate	Baltimore
1284	" " " "	Truckers' Guano	Fallston
1615	Lazaretto Guano Co., Baltimore, Md.	Ammoniated Bone Phosphate	Mt. Airy
1529	" " " "	Crop Grower for Wheat, etc.	Woodsboro
1495	" " " "	Dissolved Bone	Mt. Airy
1432	" " " "	Forsythe & Linthicum Mixture	Baltimore
1618	" " " "	H. G. Dissolved Bone Phosphate and Potash	Baltimore
1546	" " " "	Harford Bone	Washington Grove.
1435	" " " "	Lazaretto Alkaline Phosphate	Baltimore

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NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1635	1.22	1–1½	2.31	1½–2	1.30	9.18	8–10	10.48	22–26*	$19.45	$ 16.30 to 21.60
1223	2.47	2½–3	1.90	2–2½	2.39	9.73	9–11	12.12	10½–13	25.25	24.10 to 29.40
1466	1.63	1½–2	2.13	1½–2	1.84	9.50	9–11	11.34	10½–13	21.58	19.00 to 24.80
1604	.....	.....	.....	.....	1.80	14.02	14–15	15.82	26–30*	14.02	14.00 to 15.00
1625	0.89	½–1	2.41	1½–2	1.92	8.76	8–10	10.68	10–13	18.11	14.60 to 20.20
1592	0.67	½–1	2.04	2–3	1.91	10.54	9–11	12.45	22–26*	18.92	15.80 to 21.40
1593	1.37	1–2	2.96	2–3	2.62	11.47	8–11	14.09	9–12½	24.36	16.60 to 25.70
1591	.....	...	1.84	3–4†	1.58	8.28	7–9	9.86	15–17*	11.12	8.92 to 11.40
1561	2.55	3.	2.41	1½	2.11	9.00	8	11.11	.....	25.16	23.40
1398	.....	.....	0.17	2.17	.....	.....	2.61	0.47	.....	0.48	5.73
1283	1.55	1½–2	3.38	2.	1.56	8.66	9.–10	10.22	.....	21.59	19.20 to 22.40
1643	.....	.....	1.92	2–3	2.07	10.01	10–12	12.08	.....	13.14	12.40 to 15.60
1638	1.24	1–2	1.97	2–3	2.28	8.02	9–11	10.30	.....	18.41	17.20 to 24.80
1284	3.74	3–4	2.77	3–4	1.98	7.93	10–12	9.91	.....	29.16	27.60 to 34.20
1615	1.27	1	2.49	2	2.03	9.50	9	11.53	.....	20.69	17.20
1529	2.21	2	2.00	2	1.60	9.36	10.	10.96	.....	23.43	22.40
1495	2.24	2	.....	.....	1.49	9.83	10	11.32	.....	21.65	20.00
1432	2.47	2	3.10	2½	2.64	11.42	9	14.06	14.	28.88	24.80
1618	.....	.....	2.78	3–4	0.62	12.48	12–13	13.10	.....	16.07	15.60 to 17.80
1546	3.18	3	.....	.....	11.97	6.02	.....	17.99	*35	27.22	21.60
1435	.....	.....	2.17	25‡	0.58	12.11	11	12.69	*25	14.94	11.00

*Bone Phosphate. Divide by 2.18 to reduce to Phosphoric Acid.
†Sulphate of Potash. Divide by 1.85 to reduce to Potash.
‡Alkaline Salts.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1417	Lazaretto Guano Co., Baltimore, Md.	Lazaretto Bone Com'd for Wheat and Grass	Baltimore
1324	" " "	Pure Dissolved Animal Bone	Medford
1649	" " "	Pure Dissolved S. C. Bone	Comus
1665	" " "	South Carolina Bone	Rockville
1360	Lechlider Bros., Hagerstown, Md.	Dissolved Bone Phosphate	Hagerstown
1361	" " "	Eagle Bone Phosphate	Hagerstown
1363	" " "	Soluble Bone	Hagerstown
1362	" " "	South Carolina Bone	Hagerstown
1234	Lister Ag'l Chem. Works, Newark, N. J.	Ammoniated Dissolved Bone Phosphate	Gaithersburg
1232	" " "	Celebrated Ground Bone.	Gaithersburg
1297	" " "	Harvest Queen Phosphate	Glencoe
1400	" " "	Lister's Success	Gaithersburg
1296	" " "	Standard Pure Bone Phosphate	Glencoe
1295	" " "	U. S Phosphate	Glencoe
1405	P. Mann & Co., Washington, D. C.	Potomac A Super Phosphate	Silver Spring
1447	Maryland Fertilizer Co., Baltimore, Md.	Alkaline Bone	Baltimore
1380	" " "	mmoniated Bone	Hancock
1541	" " "	Dissol ed Phosphate	Germantown
1662	" " "	Dissolved S. C. Bone	Chewsville
1445	" " "	Linden Super Phosphate	Baltimore
1460	" " "	Sangston's Cereal and Plant Food	Baltimore

Maryland Agricultural College, September, 1894, to January, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed	Found.	Guaranteed.		
1417	1.56	1–2	2.52	2–3	1.57	9.44	9–11	11.01	.....	$21.41	$17.20 to 24.80
1324	2.77	2½		.....	0.96	13.88	15	14.84	17	28.32	29.20
1649	...	...	....	....	.....	2.60	15.60	14	18.20	.....	15.60	14.00
1665	..	....	....	.....	...	1.40	14.36	14	15.76	.....	14.36	14.00
1360	0.82	1½	1.66	2.	1.71	6.03	7.	7.74	8.	13.54	15.40
1361	0.62	1	1.66	1½	1.30	5.41	6.	6.71	7.	11.74	13.60
1363	.07	½	2.36	1½–2	1.18	5.23	5–7	6.41	6–9	8.53	10.10 to 14.00
1362	.....	.....	2.24	1–2	0.95	4.90	6–9	5.85	.....	7.97	7.20 to 11.40
1234	2.33	2.20	1.80	1½	2.81	9.58	9	12.39	11	24.65	22.60
1232	3.47	3	.....	.....	10.32	6.63	12	16.95	*26	28.04	26.10
1297	2.05	†	2.16	†	2.79	9.28	†	12.07	†	21.01	.....
1400	2.03	1½	2.51	2½	1.71	10.67	9½	12.38	.....	25.04	20.40
1296	2.97	†	1.80	†	3.38	9.10	†	12.48	†	26.99	.....
1295	2.12	1	2.46	2	1.60	8.10	7	9.70	8	22.11	15.40
1405	2.73	2–3	1.28	1¼–3	3.29	7.65	9–10	10.94	.....	23.61	20.30 to 27.60
1447	....	.....	3.02	3	0.38	12.37	11	12.75	.....	16.14	14.60
1380	2.62	2¼	2.04	1½	2.90	8.91	9	11.81	.....	25.36	21.60
1541	.....	.....	....	.....	1.42	14.01	13	15.43	.....	14.01	13.00
1662	....	.....	.....	.....	1.11	13.64	13	14.75	.....	13.64	13.00
1446	.....	.....	2.11	2	1.13	11.90	9	13.03	.....	14.88	11.40
1469	1.66	1¼	2.70	2	3.15	9.29	10.	12.44	.....	22.92	19.40

*Bone Phosphate. Divided by 2.18 to reduce to Phosphoric Acid.
†Guarantee illegible on the bag.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1388	Maryland Fertilizer Co., Baltimore, Md.	Tornado Fertilizer	Cumberland
1442	Maryland Grange Agency, Baltimore, Md.	Dissolved S. C. Bone	Baltimore
1468	" " "	South Carolina Bone	Thurston
1679	" " "	Dissolved S. C. Rock	College
1623	" " "	Pure Bone Meal	Baltimore
1668	J. N. Maynard, Sykesville, Md.	Half-and-Half	Fountain Mills
1515	" " "	H. G. Bone Phosphate	Monrovia
1670	" " "	Maynard H. G. S. C. Phosphate	Green Valley
1238	" " "	H. G. S. C. Rock	Haight
1578	William McKinney, Centreville, Md.	McKinney's Compound	Centreville
1323	Medford Fertilizer Com'y., Medford, Md.	No. 1, Bone Phosphate	Medford
1322	" " "	No. 3, Bone Phosphate	Medford
1535	F. Mehring, Bruceville, Md.	Acid Phosphate	Bruceville
1533	" " "	Baumgardner's Mixture	Frederick
1373	" " "	Dissolved Raw Bone	Hagerstown
1372	" " "	Emmert's Half & Half	Hagerstown
1371	" " "	$26 Phosphate	Hagerstown
1473	A. B. Meyer, St. Louis, Mo.	Pure Bone Meal	Ellicott City
1498	Miller Fertilizer Co., Baltimore, Md.	Anderson's Harvest Queen	Mt. Airy
1512	" " " "	Clinch Phosphate	Monrovia
1606	" " " "	Dissolved S. C. Bone	Ellicott City

Maryland Agricultural College, September, 1894, to January, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1388	0.90	½	4.38	3¼	1.14	11.04	11	12.18	... ...	$22.79	$ 19.10
1442	.....	.....	.....	.....	1.17	14.95	.....	16.12	.....	14.95	.....
1468	.....	.....	.....	.....	0.88	15.24	14–16	16.12	.....	15.24	{ 14.00 to 16.00
1679	.....	.....	.....	.....	0.85	15.31	.....	16.16	.....	15.31	.....
1623	4.41	4–5	.....	.....	.....	.....	.....	22.21	20–29	31.08	.....
1668	1.68	1¼	.....	.....	3.06	11.97	12.	15.03	.....	22.92	19.40
1515	2.49	2¼	2.52	2¼	1.50	9.97	9	11.47	.....	25.84	22.50
1670	.....	.....	.....	.....	1.03	15.45	14	16.48	.....	15.45	14.00
1238	.....	.....	.....	.....	0.45	14.97	14	15.42	.....	14.97	14.00
1578	2.35	1½–2	1.25	1¾–2	2.90	8.53	10–11	11.43	.....	22.88	{ 20.10 to 23.60
1323	1.81	1½–2	1.88	1½–2	3.18	9.90	9½–10	13.08	.....	22.23	{ 19.20 to 22.40
1322	1.21	1–2	2.94	2¾–3½	1.94	9.34	5–6	11.28	.....	20.74	{ 13.30 to 19.40
1535	.....	.....	.....	.....	2.30	14.70	12	17.00	.....	14.70	12.00
1533	0.87	1	1.23	½	2.43	12.99	12	15.42	.....	22.01	19.00
1373	1.81	1	.....	.....	1.50	16.75	14	18.25	.....	28.24	20.80
1372	1.02	1	.....	.....	2.42	14.89	12	17.31	.....	23.41	18.40
1371	1.51	1	1.07	½	3.59	10.47	9	14.06	.....	22.03	15.40
1473	5.00	4–5	.....	.....	.....	.....	.....	21.99	22–25	29.34	.....
1498	1.26	1–2	1.84	1½–2	1.11	8.17	7–9	9.28*	19.65–26.19*	17.72	{ 15.40 to 23.00
1512	1.09	1–2	1.68	1½–2½	1.29	7.93	7–9	9.22*	19.55–25.19*	16.67	{ 15.40 to 23.60
1606	.....	.....	.....	.....	1.04	14.46	14–16	15.50	30–32*	14.46	{ 14.00 to 16.00

*Bone Phosphate. Divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1244	Miller Fertilizer Co., Baltimore, Md.	Ground Bone	Elkton
1245	" " " "	Harvest Queen Phosphate	Elkton
1233	" " " "	Pure Bone Meal	Gaithersburg
1452	" " " "	Standard Super Phosphate of Lime	Baltimore
1392	Mt Airy Manufact'g Co., Baltimore, Md.	Ammoniated P. G. Super Phosphate	Oakland
1391	" " "	Insula Guano	Oakland
1393	" " "	Piedmont Dissolved Bone Phosphate	Oakland
1410	" " "	Piedmont Raw Bone Mixture	Baltimore
1459	" " "	S. C. Bone Phosphate	Baltimore
1292	G. R. Mowell, Glencoe, Md	Pure Dissolved S. C. Rock	Glencoe
1293	" " " "	Standard Bone Phosphate	Glencoe
1583	Nickerson Fertilizer Co., Easton, Md.	Eastern Shore Domestic Guano	Centreville
1602	" " "	Linthicum's Special Mixture	Ellicott City
1555	" " "	Mixture	Easton
1678	" " "	S. C. Phosphate	Kennedyville
1677	" " "	S. C. Bone and Potash	Compton
1560	" " "	S. C. Phosphate and Potash	Easton
1558	" " "	Special Mixture	Easton
1263	North-Western Fert'r Co., Chicago, Ill.	Horseshoe Brand Ammoniated Dissolved Bone	Rising Sun
1261	" " "	Horseshoe Brand National Bone Dust	Rising Sun
1285	" " "	Horseshoe Brand Prarie Phosphate	Fallston

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NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1244	2.64	3–4	.....	.....	10.03	5.58	.....	15.61	15–17	$23.28	$.....
1245	1.62	1¼–2	1.80	2¼–3	2.00	10.41	10–12	12.41	11½–14	22.33	{ 20.60 { 27.20
1233	4.50	4–5	.....	.....	.....	.....	.....	21.26	20–30	31.09	.....
1452	2.94	2.85–3¼	2.53	2¼–3	1.83	11.15	10–12	12.98	25.10–31.65*	29.28	{ 27.00 { 32.50
1392	1.00	1–1½	0.93	1–1½	2.96	6.98	8–9	9.94	9–10	15.28	{ 15.40 { 19.20
1391	0.33	¼–½	1.06	1–1½	1.79	4.49	5–6	6.26	7–8½	9.05	{ 9.40 { 12.50
1393	.....	.....	0.92	1.	1.52	10.50	10½	12.02	11½	12.21	12.10
1410	1.20	1–2	1.0-	1–2	2.92	7.19	7–9	10.11	11–14	16.43	{ 16.00 { 24.20
1459	.....	.....	....	.....	1.12	14.00	13–15	15.12	14–17	14.00	{ 13.00 { 15.00
1292	.....	.....	.....	.....	1.58	13.24	13–15	14.82	14–18	13.24	{ 13.00 { 15.00
1293	2.44	2½–3	1.80	1½–2½	1.60	9.35	9–12	10.95	10–15	24.10	{ 23.20 { 31.20
1583	1.78	2–3	3.16	3–4	2.75	9.53	9–10	12.28	11–13	24.00	{ 23.60 { 30.60
1602	1.15	½–1	2.02	2–3	3.62	8.69	8–10	12.31	.....	19.62	{ 14.00 { 19.60
1555	0.90	½–1	2.95	2–3	2.59	10.12	8–10	12.71	.....	20.83	{ 14.00 { 19.60
1678	.....	.....	.....	.....	3.17	16.22	13–15	19.39	.....	16.22	{ 13.00 { 15.00
1677	.....	.....	2.33	3–4	3.67	11.03	10–12	14.70	11–14	15.30	{ 14.00 { 17.60
1560	.....	.....	2.13	3–4	3.38	10.49	10–12	13.87	11–14	13.40	{ 14.00 { 17.60
1558	0.69	½–1	2.05	2–3	3.32	11.96	8–10	14.28	.....	21.56	{ 14.00 { 19.60
1263	2.97	2½–3	1.20	.54–1.08	4.56	8.38	8–9	12.94	12–13½	26.12	{ 22.65 { 26.80
1261	2.95	2½–3½	.....	.....	5.11	7.92	8–9	13.03	20–30*	24.37	{ 22.00 { 27.50
1285	2.42	2–2½	.....	.....	3.66	6.76	6–8	10.42	20–25*	19.99	{ 17.00 { 22.00

*Bone Phosphate. Divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

NO.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1264	North-Western Fert'r Co., Chicago, Ill.	Horseshoe Brand Ralston Bone Meal	Rising Sun
1470	" " "	Horseshoe Brand Dissolved Raw Bone	Laurel
1597	G. Ober & Sons Co., Baltimore, Md.	Bone Phosphate, South Carolina	Sykesville
1539	" " " "	Dissolved Animal Bone	Germantown
1540	" " " "	Dissolved Bone Phosphate, S. C	Germantown
1581	" " " "	Dissolved Bone Phosphate and Potash	Centreville
1537	" " " "	J. H. Gassaway's Ammoniated Dissolved Bone.	Germantown
1538	" " " "	Special Ammoniated Dissolved Bone	Germantown
1448	Patapsco Guano Co., Baltimore, Md.	Baltimore Soluble Phosphate	Baltimore
1587	" " " "	Bone and Potash	Centreville
1369	" " " "	Genuine Kainit	Hagerstown
1640	" " " "	Grain and Grass Producer	Baltimore
1632	" " " "	Grange Mixture Ammoniated Phosphate	Baltimore
1370	" " " "	Pure Dissolved S. C. Bone	Hagerstown
1579	" " " "	Soluble Bone	Centreville
1375	Moro Phillips Chemical Co., Philadelphia, Pa,	Dissolved Phosphate	Hancock
1377	" " " "	Soluble Bone Phosphate	Hancock
1269	R. H. Pollock, Baltimore, Md.	Ammoniated Bone Phosphate	Bel Air
1650	" " "	Dissolved Animal Bone	Taylor
1290	" " "	Dissolved S. C. Bone	Parkton
1608	" " "	Ground Animal Bone	Ellicott City

Maryland Agricultural College September, 1894, to January, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed	Found.	Guaranteed.		
1264	3.43	3–4	.....	.....	.....	.....	.....	19.86	13–18	$24.13	$ 19.80 to 26.80
1470	3.21	3–4	.....	.....	6.34	11.67	10–12	18.01	35–40*	30.64	27.60 to 34.00
1597	....	.....	.....	.....	1.15	15.82	13	16.97	.....	15.82	13.00
1539	3.35	2½	.....	.....	3.31	11.71	10	15.02	12	29.44	23.20
1540	.....	.....	.....	.....	1.88	14.92	13	16.80	15½	14.92	13.00
1581	.....	.....	1.33	1½	1.69	13.05	12	14.74	14	15.29	14.60
1537	3.04	2¼	3.51	2	1.94	9.90	9	11.84	11	29.41	23.40
1538	1.80	1½	2.11	1½	1.18	10.41	8	11.59	10	22.93	18.60
1448	.....	.....	2.02	1½	0.55	12.90	10	13.45	12	15.54	12.60
1587	.....	.....	2.31	1½	0.63	11.03	11	11.66	.....	14.05	12.80
1369	.....	.....	12.11	23†	.....	.....	.....	.....	.....	14.53	14.70
1640	1.36	1	2.02	2	1.41	10.42	10	11.83	12	21.21	19.60
1632	2.05	2	1.92	1½	1.63	9.70	10	11.33	12½	23.11	23.30
1370	.....	.....	.....	.....	2.70	13.71	13	16.41	.....	13.71	13.00
1579	.....	.....	.....	.....	1.11	15.44	13–15	16.55	15–17	15.44	13.00 to 15.00
1375	.....	.....	.....	.....	1.67	12.59	12–14	14.26	13–16	12.59	12.00 to 14.00
1377	.....	.....	.....	.....	1.34	14.53	14–17	15.87	30–35*	14.43	14.00 to 17.00
1269	2.46	2–3	2.22	2–3	0.99	9.49	10–13	10.48	11–15	24.48	23.00 to 32.40
1650	2.84	2½	.....	.....	1.00	13.22	12	14.22	.....	27.82	24.40
1290	.....	...	.....	.....	1.55	14.45	14	16.00	15	14.45	14.00
1608	4.69	4½	.....	.....	.....	.....	.....	21.92	22	31.61	.....

*Bone Phosphate. Divide by 2.18 to reduce to Phosphoric Acid.
†Sulphate of Potash. Divide by 1.85 to reduce to Potash.

Table of Analysis and Valuation of Fertilizers Made at the

NO.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1382	R. H. Pollock, Baltimore, Md.	Soluble Bone Phosphate	Hancock
1288	" " "	Special Wheat Grower	Parkton
1642	Powell Fertilizer & Chemical Co., Baltimore, Md.	Bone and Potash Fertilizer	Baltimore
1507	Ramsburg Fertilizer Co., Frederick, Md.	Ammoniated Bone	Monrovia
1509	" " "	Dissolved Animal Bone	Monrovia
1491	" " "	Dissolved Bone Super Phosphate	Mt. Airy
1506	" " "	Excelsior Half and Half	Monrovia
1485	" " "	Excelsior Plant Food	Mt. Airy
1675	" " "	Mixture for Wheat	Plane No. 4
1510	" " "	Old Virginia Compound	Monrovia
1655	Rasin Fertilizer Co., Baltimore, Md.	Acid Phosphate	Baltimore
1453	" " " "	Bone and Potash	Baltimore
1231	" " " "	Dissolved Bone	Gaithersburg
1384	" " " "	Empire Guano	Cumberland
1457	" " " "	Ground Bone	Baltimore
1647	" " " "	Special Tobacco Plant Guano	Baltimore
1379	" " " "	Pure Dissolved S. C. Bone	Hancock
1278	Henry Reckord M'f'g Co., Fallston, Md.	Dissolved S. C. Bone	Bel Air
1598	" " " "	Fine Bone	Bel Air
1276	" " " "	Raw Bone	Bel Air
1277	" " " "	Special Compound	Bel Air

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NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1382	.....	.....	2.00	2	0.66	11.88	11	12.54	12	$14.54	$13.80
1288	1.35	1	3.30	1	1.17	9.02	9	10.19	11.	20.88	17.20
1642	.....	.....	2.67	2–2½	0.36	10.36	10–12	10.72	.....	13.70	12.40 to 15.00
1507	0.72	1–2‡	1.36	1–2	5.58	8.48	10–12	14.06	13–16	18.04	17.00 to 23.20
1509	2.27	2–3	.....	.....	4.87	11.93	10–12	16.80	14–17	26.32	22.40 to 29.40
1491	.....	.....	.....	.....	1.87	13.16	13–15	15.03	15–16	13.16	13.00 to 15.00
1506	1.40	1–2	1.29	1–2	7.28	8.04	10–12	15.32	12–15	20.77	18.40 to 26.60
1485	2.56	2–3	1.07	1	4.82	9.08	9–10	13.90	11–13	24.22	21.20 to 27.00
1675	.....	.....	1.97	2–4	2.37	10.14	10–12	12.51	.....	15.47	12.40 to 16.80
1510	1.73	1½	1.44	3.–4†	4.44	8.44	8–10	12.88	8–9	21.44	20.40 to 24.60
1655	.....	.....	.....	.....	1.60	13.17	14.	14.77	15	13.17	14.00
1453	...	.....	1.61	1¼	1.32	13.18	12	14.50	13	15.64	13.90
1331	2.65	2	.....	.....	2.68	10.57	10	13.25	12	24.89	21.20
1384	2.75	2.43	4.68	6	2.23	8.46	8	10.69	10	28.11	27.72
1457	4.37	3	.....	.....	.....	.....	.....	21.84	50*	30.84	.....
1647	3.79	4	2.39	2	3.79	7.89	7	11.68	8	29.77	27.40
1379	....	.2	.....	.....	0.18	15.67	14	15.85	15	15.67	14.00
1278	.....	.....	...	.....	1.28	13.80	14–16	15.08	.....	13.80	14.00 to 16.00
1598	2.82	3	.....	.....	.	.....	.....	26.11	50–60*	31.02	.....
1276	4.55	3	....	.....	.....	.....	.....	20.01	20.	23.43	.....
1277	2.14	1½–3	2.12	2–3	1.36	9.66	9–11	11.02	12–14	23.51	19.20 to 28.80

*Bone Phosphate. Divide by 2.18 to reduce to Phosphoric Acid.
†Sulphate of Potash. Divide by 1.85 to reduce to Potash.
‡Sulphate of Ammonia. Divide by 4 to reduce to Ammonia.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1376	John S. Reese & Co., Baltimore, Md.	Dissolved S. C. Phosphate	Hancock
1645	" " " "	Elm Bone Phosphate	Baltimore
1626	" " " "	Half and Half	Baltimore
1661	" " " "	Mayflower	Jessups
1349	Rinehart & Clemson, Union Bridge, Md.	No. 1 Bone Phosphate	Union Bridge
1350	" " " "	No. 2 Bone Phosphate	Union Bridge
1351	" " " "	No. 3 Bone Phosphate	Union Bridge
1332	H. S. Roberts & Co., Westminster, Md.	Big Gun	Westminster
1334	" " " "	Governor	Westminster
1335	" " " "	Leader	Westminster
1331	" " " "	Pride	Westminster
1333	" " " "	Super "A"	Westminster
1243	Scott Fertilizer Co., Elkton, Md.	Pure Dissolved Animal Bone	Elkton
1241	" " " "	Pure Ground Bone	Elkton
1240	" " " "	Standard Phosphate	Elkton
1242	" " " "	Sure Growth Bone Phosphate	Elkton
1239	" " " "	Tip Top Soluble Bone	Elkton
1527	D. A. Sharretts, York Road, Md.	Ammoniated Super Phosphate	Woodsboro
1262	E. A. Sharretts & Co., Baltimore, Md.	Ammoniated Bone	Rising Sun
1659	" " " "	Fish, Rock and Potash	Baltimore
1664	J. D. Simmons, Hagerstown, Md.	Excelsior Fruit Producer	Hagerstown

Maryland Agricultural College, September, 1894, to January, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed	Found.	Guaranteed.		
1376	.....	.....	.....	.....	1.78	14.64	14	16.42	30*	$14.64	$14.00
1645	.....	.....	.....	.....	1.43	14.71	14	16.14	17	14.71	14.00
1626	1.32	1	0.60	.6	1.35	13.00	11.	14.35	23*	22.41	19.72
1661	2.41	2½–3	2.07	2¼–3	1.16	10.19	8½–10	11.35	10–13	25.05	23.80 to 28.80
1349	1.79	2½–3½	2.91	2½–3	3.57	6.89	5–7	10.46	25–30*	21.06	22.60 to 29.60
1350	1.33	1½–2½	2.50	2½–3	2.11	7.11	7–9	9.22	18–22*	18.12	18.30 to 25.30
1351	.91	¾–1¼	3.71	3–5	1.10	7.63	6–8	8.73	16–20*	17.92	14.40 to 21.20
1332	1.82	2.	2.14	2.	3.00	9.57	10.	12.57	.....	23.13	22.40
1334	1.38	1½	2.08	2½	1.74	10.14	9.	11.88	22*	21.23	19.80
1335	.94	1	1.23	1½	1.09	10.73	8	11.82	18*	18.77	15.40
1331	2.58	2½	1.85	2.	.94	12.03	11.	12.97	13	27.54	26.80
1333	.78	¾	1.22	1.	2.11	7.12	7.50	9.23	8½	14.39	13.80
1243	2.59	2½–3½	.....	.....	3.75	12.38	13–15	16.13	.....	27.47	25.60 to 32.00
1241	5.06	4.	.....	.....	.....	.....	.....	23.91	22.	26.18	.....
1240	1.73	1½–3	2.40	2–3	2.83	7.95	8–10	10.78	.....	21.04	18.00 to 27.60
1242	2.14	2–3	2.85	2–3	4.68	9.82	9–11	14.50	11–14	26.57	22.40 to 30.60
1239	.....	.....	.....	.....	2.48	14.36	13–15	16.84	.....	14.36	13.00 to 15.00
1527	0.96	1.	1.24	1	1.69	9.61	9	11.30	.....	17.87	16.00
1262	0.69	½–1¼	1.81	1–2	1.37	5.00	5–7	6.37	12–16*	11.75	9.80 to 17.00
1659	0.38	¼–¾	0.63	½–1	1.32	6.80	5–7	8.12	10–14*	11.23	8.20 to 13.86
1664	1.11	1	6.79	6½	1.21	6.50	6½	7.71	.....	21.12	19.60

*Bone Phosphate. Divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling
1663	J. D. Simmons, Hagerstown, Md.	Wheat and Clover Producer	Hagerstown
1344	Slingluff & Co., Baltimore, Md.	Baltimore Dissolved Bone	New Windsor
1493	" " "	Dissolved S. C. Bone	Mt. Airy
1451	" " "	Native Super Phosphate	Baltimore
1345	" " "	Pure Raw Bone Dissolved	New Windsor
1652	W. R. Steiner, Frederick, Md.	Crop Grower	Boyds
1356	J. W Stonebraker & Son, Hagerstown, Md.	Dissolved Bone	Hagerstown
1358	" " "	Dissolved Bone Phosphate	Hagerstown
1355	" " "	Dissolved S. C. Rock	Hagerstown
1359	" " "	Extra Fine Ground Raw Bone	Hagerstown
1357	" " "	Standard Dissolved Bone	Hagerstown
1522	D. V. Stauffer, Frederick, Md.	Ammoniated Bone Super Phosphate	Frederick
1517	" " "	Stauffer's Standard	Monrovia
1341	Jos. A. Stauffer, New Windsor, Md.	Butcher House Phosphate	New Windsor
1342	" " " " "	Maynard's No. 1 Ammoniated Bone Phosphate	New Windsor
1340	" " " " "	Soluble Wheat Grower	New Windsor
1513	J. W. Sullivan, Monrovia, Md.	S. S. S., Sullivan's Sure Success	Monrovia
1462	Susquehanna Fertilizer Co. Baltimore, Md.	Ammoniated Bone Phosphate	Baltimore
1547	" " "	Ground Bone	Washington Grove
1343	" " "	Superior Rock Phosphate	New Windsor
1548	" " "	X X V Phosphate	Washington Grove

Maryland Agricultural College, September, 1894, to January, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1663	2.24	2	6.97	6	6.09	8.30	12.	14.39	.....	$30.93	$29.60
1344	1.14	1–2	1.37	1–2	1.19	11.90	10–13	13.09	.....	21.19	17.20 to 24.80
1493	.....	.....	.....	.....	1.27	13.24	13–15	14.51	15–16	13.24	13.00 to 15.00
1451	2.71	.....	2.47	.....	3.49	10.34	.....	13.83	.....	28.30	.....
1345	2.63	2½–3	.....	.....	1.86	11.80	11–13	13.66	30–35*	25.80	25.00 to 30.00
1652	1.64	2½–3½	2.33	1½–2½†	1.24	2.14	8–10	3.38	10–13	13.42	21.70 to 29.30
1356	3.16	2	.....	.....	9.58	8.56	11	18.14	16	28.66	24.20
1358	1.93	1	1.52	2.	6.34	9.01	9	15.36	12.	24.15	19.00
1355	.....	.....	.....	.....	1.20	14.10	13	15.30	14½	14.10	13.00
1359	4.46	4	.....	.....	...	.....	... ...	22.53	46*	29.99	.....
1357	2.27	2	.....	.....	7.09	8.88	10	15.97	14.	23.99	22.40
1522	1.65	1½	1.55	1½	2.42	11.36	11	13.78	.....	23.54	21.00
1517	2.92	2.85	1.05	1½	3.16	10.49	10	13.59	.....	27.39	25.20
1341	0.93	1	3.82	3	1.59	7.74	8	9.33	10	18.54	18.40
1342	1.63	1	3.43	3	1.35	7.69	7½	9.04	.....	20.68	16.60
1340	0.77	¼	3.41	3	1.44	7.36	7½	8.80	9½	16.86	14.80
1513	2.30	2	2.03	2.	3.04	9.44	8	12.48	.....	24.79	20.00
1462	1.87	1¼–2½	1.91	1¼–2½	2.29	12.01	9–11	14.30	11–14	25.55	18.50 to 28.00
1547	4.00	3–4	.....	.....	.....	.....	.....	20.72	18–20	25.16	.....
1343	.....	.....	.....	.....	1.16	14.80	13–15	15.96	30.–35*	14.80	13.00 to 15.00
1548	1.32	1–2	1.37	1–2	1.64	8.45	8–10	10.19	10–13	18.04	16.00 to 24.20

*Bone Phosphate. Divided by 2.18 to reduce to Phosphoric Acid.
†Potash Salts.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1396	Swift & Co., Chicago, Ill.	Gound Steamed Bone	Oakland
1395	" " " "	Raw Bone Meal	Oakland
1480	Sykesville F. & H. F. Co., Sykesville, Md.	Pure Dissolved Bone	Sykesville
1474	Talbott & Clark, Ellicott City, Md.	Ammoniated Bone Phosphate	Ellicott City
1620	H. S. Taveau & Co., Baltimore, Md.	Bone Mixture	Baltimore
1657	" " " "	Dissolved S. C. Bone	Baltimore
1619	" " " "	Wheat and Grass Compound	Baltimore
1365	D. A. Thomas, Hagerstown, Md.	Bone Mixture	Hagerstown
1366	" " "	Dissolved Bone	Hagerstown
1368	" " "	Farmers' Mixture	Hagerstown
1367	" " "	Pure Raw Bone	Hagerstown
1532	S. P. Thomas & Sons, Philadelphia, Pa.	Improved Super Phosphate	Woodsboro
1383	" " " "	S. C. Phosphate	Hancock
1531	" " " "	Special S. C. Phosphate	Woodsboro
1268	Thompson & Edwards, Chicago, Ill.	Pure Ground Bone	Rising Sun
1577	Walter Todd, Baltimore, Md.	Rock and Potash Phosphate for Wheat.	Centreville
1631	" " "	No. 1, Standard Bone Phosphate	Baltimore
1252	Tygert-Allen Fertilizer Co., Philadelphia, Pa.	Star Bone Phosphate	North East
1486	J. Tyson & Son, Frederick, Md.	Ammoniated Super Phosphate of Lime	Mt. Airy
1542	" " "	Ammoniated Super Phosphate of Lime	Boyd's
1487	" " "	Dissolved Raw Bone	Mt. Airy

Maryland Agricultural College, September, 1894, to January, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Camparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1396	3.82	4-5	.....	.....	.....	.....	.....	26.15	52-55*	$33.26	$.....
1395	4.71	4½-5½	.....	.....	.....	.....	.....	25.90	50-60*	31.68	.....
1480	2.59	2½	.....	.....	4.30	10.02	10.	14.32	12.	25.96	23.20
1474	2.42	2	2.61	2	4.05	6.73	13	10.78	.....	23.32	26.00
1620	.....	.....	1.57	1¾-2	1.66	9.87	8½-9	11.53	18-25*	12.41	10.60 12.20
1657	.....	.....	.....	.....	2.58	15.11	13-14	17.69	27-30*	15.11	13.00 14.00
1619	.....	.....	2.10	2-2½	0.49	12.21	10-11	12.70	.....	14.93	12.40 14.00
1365	1.70	1½	2.43	2	3.20	9.33	8	12.53	.....	22.84	18.00
1366	2.28	2.	2.39	2½	1.16	10.10	10	11.26	.....	24.81	23.00
1368	1.04	¾	2.38	1½	2.24	8.04	8.	10.28	.....	18.01	14.40
1367	4.86	4	.....	.....	.....	.....	.....	22.04	22	30.70	.....
1532	1.17	½-2	.....	.....	2.68	11.09	12-15	13.77	30-38*	19.60	17.60 27.80
1383	.....	.....	.....	.....	3.90	13.70	13-16	17.60	14-18	13.70	13.00 16.00
1531	.....	.....	.....	.....	3.02	12.98	14-16	16.00	15-18	12.98	14.00 16.00
1268	3.05	3-4	.....	.....	.....	.....	.....	27.60	54-57*	31.41	.....
1577	.....	.....	1.25	2-3	.71	13.40	10-12	14.11	11-13	15.18	12.80 16.40
1631	1.30	1½-2½	2.17	2-3	1.31	10.25	10-12	11.56	12-14	20.89	21.00 29.20
1252	2.41	2½-3	3.11	2½-3¼	2.36	9.09	8½-11	11.45	10½-14	25.70	24.40 30.90
1486	1.14	2-3	.11	1-2	1.71	11.38	8-10	13.09	.....	19.25	18.80 26.40
1542	1.13	2-3	.12	1-2	1.58	11.85	7-10	13.43	.....	19.69	17.60 26.40
1487	2.62	.....	.....	.....	6.79	10.88	.....	17.67	.....	27.61	.....

*Bone Phosphate. Divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1431	J. Tyson & Son, Frederick, Md.	Dissolved S. C.	Baltimore
1524	" " "	Half and Half Super Phosphate	Frederick
1505	" " "	Special Mixture	Monrovia
1469	Joshua Walker, Baltimore, Md.	Old Pittsburg Ammoniated Bone Snper Phos.	Laurel
1528	Walton & Whann Co., Wilmington, Del.	Diamond Soluble Bone	Woodsboro
1496	" " " "	Plow Brand Raw Bone Super Phosphate	Mt. Airy
1530	" " " "	XX Acid Phosphate	Woodsboro
1483	W. H. D. Warfield, Sykesville, Md.	Pure Dissolved Animal Bone	Sykesville
1482	" " "	Special Wheat and Grass Mixture.	Sykesville
1566	Webster & Son, Cambridge, Md.	No 1, Ammoniated Bone Phosphate	Cambridge
1569	" " "	No. 2, Ammoniated Bone Phosphate	Cambridge
1567	" " "	Poudrette Mixture	Cambridge
1568	" " "	The Times	Cambridge
1419	Jas. R. Whiteford, Whiteford, Md.	Diamond Super Phosphate	Baltimore
1394	Williams & Clark, New York, N. Y.	Acorn Brand Acid Phosphate	Oakland
1572	" " " "	Orrell's Mixture	Ridgley
1575	" " " "	Pure Bone Meal	Ridgley
1570	" " " "	Royal Bone Phosphate	Ridgley
1574	" " " "	Smith's Bone and Potash	Ridgley
1573	" " " "	Smith's Formula	Ridgley
1222	Wooldridge Fertilizer Co. Baltimore, Md.	Kangaroo Komplete Kompound	Ellicott City

Maryland Agricultural College, September, 1894, to January, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1431	...	.....	.....	.....	1.12	10.80	12–14	11.92	.....	$10.80	$ 12.00 to 14.00
1524	0.77	½–1	.18	1–2	2.02	12.02	8–10	14.04	.....	18.71	12.80 to 18.40
1505	.....	.....	.....	.....	1.48	11.81	.....	13.29	.....	11.81	.....
1469	2.43	2.43	2.07	1½	3.34	8.18	8	11.52	10	24.04	22.32
1528	0.79	½	.....	.....	2.06	12.49	13	14.55	.....	19.39	17.60
1496	2.39	2¾	2.43	2¼	2.51	9.03	9	11.54	.....	24.81	24.50
1530	.....	.....	.....	.....	2.21	14.24	14	16.45	.....	14.24	14.00
1483	2.47	2	.....	.....	3.58	10.28	10	13.86	25*	24.37	21.20
1482	2.16	1½	1.24	1½	4.14	7.30	8	11.44	.....	21.37	17.40
1566	3.10	3.	2.40	3.	7.69	5.68	10	13.37	.....	26.71	27.60
1569	2.18	2½	2.37	2½	2.78	7.08	7	9.86	14*	21.73	21.40
1567	0.50	½	2.91	2½	1.12	6.06	7	7.18	.....	13.44	13.40
1568	.47	½	2.75	3.	.64	8.97	9	9.61	18*	16.32	16.40
1419	2.22	2–3	2.27	2–3	1.95	10.44	8½–10	12.39	22–28*	25.30	21.20 to 28.80
1394	.....	.....	.....	.....	2.42	13.25	12–15	15.67	13–17	13.25	12.00 to 15.00
1572	0.85	¾–1¼	1.14	1.18–2	5.11	8.39	9½–11	13.50	.....	17.90	15.82 to 20.60
1575	3.28	3–5	.....	.....	13.82	9.50	.....	23.32	20–25	32.81	.....
1570	1.73	1¼–2	2.12	2–3	3.75	7.49	7–9	11.24	8–11	20.70	16.40 to 23.60
1574	.....	.....	4.36	3–4	2.94	9.27	10–12	12.21	.....	15.68	13.60 to 16.80
1573	2.01	2–3	2.33	2.16–3	4.61	7.07	8–9	11.68	.....	22.08	20.19 to 26.40
1222	1.67	1.35	4.38	4	5.38	7.46	6	12.84	9	24.12	19.20

*Bone Phosphate. Divide by 2.18 to reduce to Potash.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1390	Wooldridge Fertilizer Co., Baltimore, Md.	Orchilla Guano	Oakland
1624	" " "	Sockless and Shoeless	Baltimore
1441	Zell Guano Co., Baltimore. Md.	Dissolved Bone Phosphate	Baltimore
1449	" " " "	Dissolved S. C. Phosphate	Baltimore
1440	" " " "	Economizer	Baltimore

Maryland Agricultural College, September, 1894, to January, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1390	.....	.....	.....	.....	11.91	4.05	.....	15.96	14	$ 9.62	$ 8.40
1624	1.37	1¼	1.16	1¼	4.28	8.74	8	13.02	16	19.93	20.90
1441	.....	.....	.....	.....	1.85	14.02	14	15.87	16	14.02	14.00
1449	.....	.....	.....	.....	0.87	13.98	12	14.85	14	13.98	12.00
1440	1.42	1	1.33	1	1.90	11.37	9	13.27	11	22.06	17.20

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Table Showing Mechanical Analysis of Ground Bone.

(The Chemical Analysis is Given in Preceding Table.)

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Fine, Less than 1-50 inch.	Fine-Medium, 1-25 to 1-50 inch.	Medium, 1-12 to 1-25 inch.	Coarse, Larger than 1-12 inch.
1287	A. Anstine, Stewartstown, Pa.	Pure Grouud Bone	14	30	36	20
1235	Baugh & Sons Co., Baltimore, Md.	Bone Meal	38	34	28	0
1639	John Bullock & Son, Baltimore, Md.	Pure Ground Raw Bone	38	20	21	21
1249	E. A. Clendenin & Bro., Colora, Md	Pure Ground Bone	21	20	45	14
1253	J. A. Cranston Co., Newport, Del.	Pure Ground Raw Bone	31	24	26	19
1404	Detrick Fertilizer Co, Baltimore, Md.	Pure Fine Ground Raw Bone	52	48	0	0
1257	Eureka Fertilizer Co., Perryville, Md.	Bone Meal	57	25	15	3
1258	" " " "	Pure Fine Ground Bone	31	29	25	15
1414	W. S Farmer & Co., Baltimore, Md.	Pure Bone Meal	51	49	0	0
1260	J. Horner, Jr., & Co., Baltimore, Md.	Slaughter House Bone Dust	28	30	42	0
1666	Hubbard & Co., Baltimore, Md.	Pure Raw Bone	40	49	11	0
1667	" " " "	Pure Raw Bone	38	40	22	0
1623	Maryland Grange Agency, Baltimore, Md.	Pure Bone Meal	44	56	0	0
1473	A. B. Meyer & Co., St. Louis, Mo.	Pure Bone Meal	38	25	32	5
1233	Miller Fertilizer Co , Baltimore, Md.	Pure Bone Meal	54	46	0	0
1264	North-Western Fertilizer Co., Chicago, Ill.	Horseshoe Brand Ralston Bone Meal	44	24	22	10
1608	R. H. Pollock, Baltimore, Md.	Ground Animal Boue	45	55	0	0
1457	Rasin Fertilizer Co., Baltimore, Md.	Gound Bone	47	53	0	0
1276	Henry Reckord M'f'g Co., Bel Air, Md.	Raw Bone	28	18	20	34
1241	Scott Fertilizer Co., Elkton, Md.	Pure Ground Bone	15	26	28	31
1359	J. W. Stonebraker & Son, Hagerstown, Md.	Extra Fine Ground Raw Bone	45	30	25	0
1547	Susquehanna Fertilizer Co., Baltimore, Md.	Ground Bone	34	27	26	13
1395	Swift & Co., Chicago, Ill.	Raw Bone Meal	37	28	28	7
1396	" " " "	Ground Steamed Bone	62	23	15	0
1367	D. A. Thomas, Hagerstown Md.	Pure Raw Bone	42	38	20	0
1268	Thomson & Edwards. Chicago, Ill.	Pure Ground Bone	52	29	16	3

LIST OF FERTILIZER MANUFACTURERS LICENSED TO SELL FERTILIZERS IN MARYLAND, IN 1894, WITH NAMES OF BRANDS FOR WHICH LICENSE HAVE BEEN OBTAINED BY EACH, SINCE AUGUST 6, 1894. THE LIST CORRECT TO AUGUST 6, 1894, MAY BE FOUND IN BULLETIN NO. 27.

Alexandria Fertilizer and Chemical Alexandria, Va.

Dissolved S. C. Bone.

Baugh & Sons Co., Baltimore, Md.

Baugh's Crop Grower.
Day's Ammoniated Bone Phosphate.
Reindollar & Co's., Fish Mixture.
Reindollar & Co's., Fish Phosphate.

Beck & Walker, Chestertown, Md.

Propagator.
Trustworthy.
Try Me.

A. D. Birely, Ladiesburgh. Md.

Ammoniated Bone Phosphate.

Chas. E. Bond, Spencerville, Md.

Dissolved Pure Raw Bone.

Chesapeake Guano Co., Baltimore, Md.

Monogram.

Cincinnati Desiccating Co., Cincinnati, Ohio.

Gilead Phosphate.
Phoenix Phosphate.

E. Frank Coe, New York City.

Ammoniated Bone Super Phosphate.
Bone anh Potash.
Soluble Bone.
XXX Super Phosphate.

E. P. Cohill, Hancock, Md.

Ground Animal Bone.

Crocker Fertilizer and Chemical Co., Buffalo, N. Y.

Niagara Phosphate.

E. E. DeLashmutt, Frederick, Md.

Half and Half.
Mixture.
S. C. Bone.

Detrick Fertilizer and Chemical Co., Baltimore, Md.

Enterprise Phosphate.
Moson's No. 4.
Special Wheat Mixture.

A. L. Duyckinck & Co., Rising Sun, Md.

Pure Ground Bone.

F. H. Eckenrode, Taneytown, Md.

O. K. Phosphate.

T. W. Eliason, Chestertown, Md.

M. P. Compound.
Our Special.

Eureka Fertilizer Co., Perryville, Md.

Alkaline Bone and Potash.
Dissolved Bone.
Peerless Bone.

Feddeman & Earle, Centreville, Md.

Bone Potash.
Enterprise.
Farmer's Friend.

Frederick Elevator Co., Frederick, Md.

Farmer's Friend.

G. W. Grafflin & Bro., Baltimore, Md.

Wilson's Wheat Fertilizer.

Griffith & Boyd, Baltimore, Md.
(The Farm Supply Co.)

Boss.
Corn and Potato.
Favorite.
Soft Ground Bone.
Standard.

Griffith & Lytle, Baltimore, Md.

Ammoniated Soluble Bone Phosphate.
Standard Bone Phosphate.

Griffith, Turner & Co., Baltimore, Md.

Soluble Bone Phosphate.

Wm. R. Griffith, Baltimore, Md.
Special (G) for Tobacco.

J. Hershey Hall, Centreville, Md.
C. C. C. Phosphate.

Hammond Bros., Hood's Mills, Md.
Hammond's Special Mixture.

F. H. Harper, Still Pond, Md.
Harper's Superphosphate.

Hubbard & Co., Baltimore, Md.
Oriental Phosphate.
Whiteford's (W) Diamond Superphosphate.

Lechlider Bros., Hagerstown, Md.
Dissolved Bone Phosphate.
Eagle Bone Phosphate.
Soluble Bone Phosphate.
S. C. Bone.

Lister Agricultural Chemical Co., Baltimore, Md.
Ammoniated Dissolved Bone.
Success.
Standard Phosphate.
U. S. Phosphate.

Wm. McKenny, Centreville, Md.
McKenney's Compound.
McKenney's Soluble.

Maryland Grange Agency, Baltimore, Md.
Agency's Favorite.
Special Wheat Grower.

Maryland Refining Co., Baltimore, Md.
Todd's No. 1, Standard Fertilizer.

J. N. Maynard, New London, Md.
Bone and Potash.

Miller Fertilizer Co., Baltimore, Md.
Anderson's Harvest Queen.
Bone Meal.
Clinch Phosphate.

Moro Phillips, Chemical Co., Philadelphia, Pa.
C. & G. Complete Fertilizer.
Dissolved Phosphate.
Soluble Bone Phosphate.

Mt. Airy Manufacturing Co., Baltimore, Md.

Piedmont Soluble Star Bone and Potash.

G. R. Mowell, Glencoe, Md.

Dissolved S. C. Rock.
Standard Bone Phosphate.

Nickerson Fertilizer Co., Easton, Md.

Eastern Shore Domestic Guano.
S. C. Phosphate.
S. C. Phosphate and Potash.

North-Western Fertilizer Co., Chicago, Ill.

Horseshoe Brand Ammoniated Dissolved Bone.
Horseshoe Brand Fine Raw Bone.
Horseshoe Brand Prairie Phosphate.
Horseshoe Brand Ralston Bone Meal.

G. Ober & Sons Co., Baltimore, Md.

J. H. Gassaway's Ammoniated Dissolved Bone.

R. H. Pollock, Baltimore, Md.

Dissolved Animal Bone.
Ammoniated Bone Phosphate.
Soluble Bone Phosphate.
Dissolved S. C. Bone.
Ground Animal Bone.
Special Wheat Grower.

Ramsburg Fertilizer Co., Frederick, Md.

Special Mixture for Wheat.

Rasin Fertilizer Co., Baltimore, Md.

Ground Bone.

Henry Reckord Manufacturing Co., Bel Air, Md.

Dissolved S. C. Rock.
Raw Bone.

John S. Reese & Co., Baltimore, Md.

Dissolved S. C. Phosphate.
Pilgrim.

S. M. Reynolds & Co., Middletown, Del.

High Grade Acidulated Phosphate.
Soluble Bone Phosphate.

Rinehart & Clemson, Union Bridge, Md.

No. 2.
No. 3.

Scott Fertilizer Co., Elkton, Md.

Pure Dissolved Bone.
Pure Ground Raw Bone.
Standard Phosphate.
Sure Growth Superphosphate.
Tip Top Soluble Bone.

E. A. Sharretts & Co., Baltimore, Md.

Ammoniated Bone.
Fish, Rock and Potash.

Slingluff & Co., Baltimore, Md.

Baltimore Dissolved Bone.

Standard Soft Phosphate Mining Co., Alexandria, Va.

Natural Plant Food.

J. W. Sullivan, Monrovia, Md.

Sullivan's Sure Success.

D. A. Thomas, Hagerstown, Md.

Farmer's Mixture.

J. P. Thomas & Co., Philadelphia, Pa.

Farmer's Choice Bone Phosphate.
Improved Superphosphate.
Normal Bone Phosphate.
Pure Ground Bone.
S. C. Phosphate.
Tip Top Raw Bone Superphosphate.

Turner & Son., Betterton, Kent Co., Md.

Turner & Son's (B).

J. Tyson & Son., Frederick, Md.

Dissolved S. C.

E. S. Valliant, Church Hill, Md.

Valiant's Special Mixture.

Williams & Clark, New York City.

Acorn Brand Acid Phosphate.
Orrel's Mixture.
Pure Bone Meal.
Royal Bone Phosphate.
Smith's Bone and Potash.
Smith's Formula.

Wooldridge Fertilizer Co., Baltimore, Md.

Bone and Potash 16-4 Mixture.
Eagle Bone.
Kangaro Komplete Kompound.
Honest Dollar.
No. 1, Pure Raw Bone.
Orchilla.
Quick Step.
Silver Gray.
Sockless and Shoeless.
XXTRY Acid Phosphate.

Fertilizer Law of Maryland.

CHAPTER 397.

AN ACT to repeal sections one, two, three, four, five, six, seven, eight, nine, ten and eleven, of Article sixty-one, of Public General Laws, entitled "Manures and Fertilizers," as amended and re-enacted by Chapter three hundred and eighty-seven, Acts of 1890, and to re-enact the same with amendments.

SECTION 1. Be it enacted by the General Assembly of Maryland, That sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11, of Article 61, of the Code of Public General Laws, as amended and re-enacted by Chapter 387, of Acts of 1890, be and the same are hereby repealed and re-enacted to read as follows:

SECTION 1. That the term fertilizer, as used in this Act, shall be held to mean any commercial fertilizer, or any article, substance or mixture sold, offered or exposed for sale for manurial purposes within this State, of which the selling price shall be more than ten dollars per ton of two thousand pounds.

That the term brand, as used in this Act, shall be held to mean the name under which the commercial fertilizer is sold, together with the statement of the percentage of valuable ingredients contained therein.

That the professor in charge of the Chemical Department of the Maryland Agricultural College shall be *ex-officio* State Chemist, or (that the term State Chemist, as used in this act, shall mean the professor in charge of the Chemical Department of the Maryland Agricultural College.)

SEC. 2. And be it enacted, That before any fertilizer is sold, offered or exposed for sale within the State, the following conditions must be complied with: (1) The importer, manufacturer, manipulator, dealer or agent shall take out a license for the sale of fertilizer, which license shall be rated upon the number of brands contemplated to be sold at the rate of fifteen dollars for each brand; said license to be prepared and furnished by the Comptroller of the Treasury, and to be issued at any time, to be good until the first day of February following; provided, that when any such importer, manufacturer or manipulator shall have taken out a license as herein provided, it shall not be necessary for any other person, as his agent or representative, to take out a license to sell the fertilizers provided for by the party who has taken out such license. (2) Every bag, barrel or package of fertilizer, and every

parcel or lot, if sold in bulk, must bear in legible print, or be accompanied by a clear and true statement showing the net pounds of fertilizer in the package or lot, the name, brand or trade-mark under which the fertilizer is sold, the name and address of the importer, manufacturer or manipulator, the place of manufacture or manipulation, and a chemical analysis stating the per centum of the minimum, and only the minimum, contained therein of nitrogen or its equivalent in available ammonia, of potash soluble in distilled water, and of available phosphoric acid.

SEC. 3. And be it enacted, That any failure to comply with any or all of the conditions provided in section two of this Act, shall be punishable by a fine of one hundred dollars ($100) for the first offence, and of two hundred dollars ($200) for every subsequent offence.

SEC. 4. And be it enacted, That any person, firm or company selling or offering for sale any fertilizer in this State, or intending so to do, and not licensed by the Comptroller as provided by this Act, shall on and before the thirty-first day of July in each and every year, send his or their name or names with the postoffice address and the names of the kinds, brands and trade-marks, and of the manufacturer, importer or manipulator of each fertilizer sold or proposed to be sold to the Maryland Agricultural College, and the same shall be registered in suitable books kept for that purpose, and any failure to comply with the provisions of this section, shall be punishable by a fine of twenty-five dollars ($25) for the first offense and of fifty dollars ($50) for every subsequent offense.

SEC. 5. And be it enacted, That it shall be duty of the Maryland Agricultural College to analyze without cost or charge, all samples of fertilizer sent to it for the purpose of being analyzed by any person or persons purchasing or procuring the same in this State for his or their use or uses; provided, such persons are not interested in the analysis desired other than a consumer, of which affidavit shall be made and shall accompany each sample or brand; and further, such samples are taken and sent as described by this Act and free of cost of transportation to said college, and it shall be the duty of the Maryland Agricultural College to procure samples as far as practicable in every year, of all the fertilizers sold and used in this State, for the purpose of analyzing the same, and any duly authorized agent or representative of the said college shall have the right to take samples as provided by the Act from any lot or parcel of fertilizer in transit or in possession or keeping of any manufacturer, manipulator, dealer or agent, and sold or offered for sale in this State, and it shall be the duty of the Maryland Agricultural College to send in the result of every sample of fertilizer to the persons from whom such sample was taken or received, and also to publish from time to time the results of the analysis made by the said college of the samples sent to or procured by it for such purpose, and it shall be the duty of the Maryland Agricultural College when reporting or publishing the result of any analysis made, to state the commerical value in dollars

and cents of the fertilizer so analyzed, per ton of two thousand pounds, such value to be based upon the analysis made by the college, and upon a standard of valuation to be ascertained, fixed and published by said college, annually, after conference with the proper officials of adjacent States.

SEC. 6. And be it enacted, That all samples of fertilizers for analysis at the Maryland Agricultural College shall be taken from unbroken packages that have not been injured in transit or by exposure, and when in the possession of purchasers within thirty days after coming into their possession, and every such sample when taken by an agent or representative of the college, shall be taken in the presence of the owner, agent or dealer in possession thereof, or of his or their representatives, and when by an owner or consumer, it shall be taken in the presence of one disinterested witness; and every sample shall be taken from a bag or package or a number of bags or packages, which shall not be less than five per cent. of the whole lot to which the sampling pertains; and in every case not over two pounds shall be taken from near the top, the bottom and the middle of the bag or packages sampled, and these portions shall be thoroughly mixed in a clean dry place, and a sutiable sample shall be taken from said mixture and placed in a suitable vessel or vessels carefully closed with identifying labels, both within and without the vessel or vessels, and the same then taken or sent by safe carriage to the said college for analysis; and there shall accompany every such sample a full and complete statement and description of the place and time of sampling, of the lot of fertilizer sampled, of all marks on the bags or packages thereof, and other facts relating to the same, and such statement and description shall be signed by the person who does the sampling and by the witness thereto.

SEC. 7. And be it enacted, That the funds received by the Comptroller from the licenses issued under this Act shall be paid into the Treasury and be set apart as a specific fund to pay the cost and expenses of conducting the analysis provided for in section five of this Act, and the Treasurer shall semi-annually pay over to the Maryland Agricultural College the money received from said licenses; provided, that the amount paid in any one year shall not be more than at the rate of fifteen dollars ($15) for each sample of fertilizer analyzed by the said College.

SEC. 8. And be it enacted, That any purchaser of fertilizer who shall be injured or defrauded by the contents of the bag, barrel or other packages, not conforming in quantity or quality to the marks, labels or statements on or accompanying the same, may recover from the seller or sellers thereof, in an action of debt, an amount equal to the purchase money of said fertilizer and the cost of suit; and in case the purchase is made of an agent of any person or persons residing out of the limits of the State of Maryland, or company or corporation whose principal place of business is out of the State, manufacturing, compounding, preparing

and furnishing for sale any such commerical fertilizer, the purchaser thereof may, at his or her option, proceed by attachment, as now provided for by law in cases of non-resident and absconding debtors, against any property, rights or credit of any person, persons, company or corporation selling, manufacturing, preparing, compounding or furnishing said fertilizer when such property, rights or credits can be found within the limits of the State of Maryland.

SEC. 9. And be it enacted, That any manufacturer, dealer, agent or other person or persons who shall adulterate, add to or to take anything from any fertilizer, sold or offered for sale within this State, or who shall use the brand or trade mark of any manufacturer or dealer other than his own, shall be deemed guilty of a misdemeanor, and shall, upon conviction thereof in any Court having jurisdiction, be punished by a fine not exceeding two hundred dollars ($200) and imprisonment in jail not exceeding six months, or by fine and imprisonment at the discretion of the Court before whom he shall be tried.

SEC. 10. And be it enacted, That this Act shall not affect parties importing, manufacturing or manipulating fertilizer for their own use if not sold or disposed of; and it shall not apply to substances and materials sold in bulk to manufacturers or manipulators of fertilizer, and nothing in this Act shall prevent the buyer and seller from making contracts in reference to the price to be paid dependent upon the composition or quality of the fertilizer contracted for, but no arrangement or agreement, verbal or written, made by or between any seller and buyer of fertilizer in this State, for the purpose of exonerating the seller or manufacturer from liability for any violation of any of the provisions of this Act shall exempt any person from such liability.

SEC. 11. And be it enacted, That it shall be the duty of all State's Attorneys to prosecute all persons accused of violating this Act, or any of the provisions of this Act, or of the Act to which this is a supplement.

SEC. 12. And be it enacted, That this Act shall take effect on the first day of May, in the year eighteen hundred and ninety-four.

Approved April 6th, 1894.

FRANK BROWN,
Governor.
JAS. H. PRESTON,
Speaker of the House of Delegates.
JOHN WALTER SMITH,
President of the Senate.

MARYLAND

Agricultural Experiment Station.

APPENDIX TO BULLETIN No. 30.

Tables For Calculating Fertilizer Analyses.

COLLEGE PARK, MD.

January, 1895.

In the tables on the following pages the familiar arrangement of logarithmic tables has been adopted. In calculating these tables the factors and atomic weights adopted by the Associations of Official Agricultural Chemists have been used.

Table I.—Gives side by side the per cent of phosphoric acid and bone phosphate corresponding to the weight of magnesium pyrophosphate and is calculated for .4 gram substance. The per cent to be added for tenths of a milligram will be found in line "D." Example: The weight of magnesium pyrophosphate is .1172 gram, what is the per cent of phosphoric acid and of bone phosphate? .1172 gram .1170+.0002 gram, which is found in the table to correspond to 18.66 per cent+.03 per cent=18.69 per cent of phosphoric acid, or to 40.74 per cent+.07 per cent=40.81 per cent of bone phosphate; the small number being found in line "D" in column 2.

The table may also be used to find the equivalent of bone phosphate in phosphoric acid or *vice versa*.

Table II.—Pages 58-61, gives phosphoric acid corresponding to weight of magnesium pyrophosphote; this table is calculated for .4 gram eubstance and for each tenth of a milligram, so that no addition is requires as in preceding table. By refererance to this table .1172 gram $Mg_2P_2O_7$ is found to correspond to 18.69 per cent P_2O_5.

Table III.—Pages 62-63, gives Potash, K_2O, corresponding to weight of $KPtCl_6$, and is calculated for each milligram and for 1 gram substance. It is recommended that the precipitate of K_2PtCl_6 is weighed to the nearest half-milligrrm. The half-milligram is easily interpolated in the table, being equivalent to .01 of one per cent. .8130 gram, K_2Pt Cl, corresponds oo 16.70 per cent K_2O and .8135 gram, K_2PtCl_6, corresponds to 15.71 per cene K_2O.

Table IV.—Page 64, gives per cent of nitrogen corresponding to each tenth c. c. of 1-10 normal solution. The writer uses fifth normal acid and tenth normal alkali, and records the equivalent of nitrogen as tenth normal solution; the percentage is then taken from the table. The table is calculated for 1 gram substance.

Table V.—Page 65, gives per cent, of Ammonia, NH_3, corresponding to each tenth c. c. of 1-10 normal solution.

Table VI.—Pages 66-69, is the same as Table II, except that it is calculatnd for .5 gram of substance.

Table VII.—Page 70, is the table in use at present in the laboratory of the Maryland Agricultural College for calculating "comparative values" of fertilizers. It gives the value per ton from percentage for 6, 3 and 2 cts. per pound. No table is used for 5 cts., or multiples of 5 cts. per pound, the value being the same as the per cent, or an easy multiple thereof. The table is calculated to tenths of per cent only, but may be used to hundredths by adding the proper amount for the latter place, which is found in line "D"; a little practice will enable this to be readily done. Example: A fertilizer contains 10.43 per cent of potash worth 6 cts. per pound, what is the value of this ingredient in a ton? 10.43 per cent=10.4 per cent+.03 per cent; value is $12.48+$.04=$12.52 per ton.

TABLE SHOWING PER CENT OF P_2O_5, IN LIGHT TYPE, AND $Ca_3(PO_4)_2$ IN HEAVY TYPE, CORRESPONDING TO WEIGHT OF $Mg_2P_2O_7$, CALCULATED FOR .4 GRAM SUBSTANCE. ADD AMOUNT IN LINE "D" FOR TENTHS OF A MILLIGRAM.

Wt. Gms.	0	1	2	3	4	5	6	7	8	9
	D.	.02 .04	.03 .07	.05 .10	.06 .14	.08 .17	.10 .21	.11 .24	.13 .28	.14 .31
.00	.00 .00	.16 .35	.32 .70	.48 1.04	.64 1.39	.80 1.74	.96 2.09	1.12 2.44	1.28 2.79	1.44 3.13
.01	1.60 3.48	1.75 3.83	1.91 4.18	2.07 4.53	2.23 4.87	2.39 5.22	2.55 5.57	2.71 5.92	2.87 6.27	3.03 6.61
.02	3.19 6.96	3.35 7.31	3.51 7.66	3.67 8.00	3.83 8.35	3.99 8.70	4.15 9.05	4.31 9.40	4.47 9.75	4.63 10.10
.03	4.78 10.44	4.94 10.79	5.10 11.14	5.26 11.49	5.42 11.84	5.58 12.18	5.74 12.53	5.90 12.88	6.06 13.23	6.22 13.58
.04	6.38 13.93	6.54 14.27	6.70 14.62	6.86 14.97	7.02 15.32	7.18 15.67	7.34 16.01	7.50 16.36	7.66 16.71	7.81 17.06
.05	7.97 17.41	8.13 17.75	8.29 18.10	8.45 18.45	8.61 18.80	8.77 19.15	8.93 19.50	9.09 19.84	9.25 20.19	9.41 20.54
.06	9.57 20.89	9.73 21.24	9.89 21.58	10.05 21.93	10.21 22.28	10.37 22.63	10.53 22.98	10.69 23.32	10.85 23.67	11.01 24.02
.07	11.16 24.37	11.32 24.72	11.48 25.06	11.64 25.41	11.80 25.76	11.96 26.11	12.12 26.46	12.28 26.81	12.44 27.15	12.60 27.50
.08	12.76 27.85	12.92 28.20	13.08 28.55	13.24 28.90	13.40 29.24	13.56 29.59	13.72 29.94	13.88 30.29	14.04 30.64	14.20 30.98
.09	14.36 31.33	14.51 31.68	14.67 32.03	14.83 32.38	14.99 32.73	15.15 33.07	15.31 33.42	15.47 33.77	15.63 34.12	15.79 34.47
.10	15.95 34.82	16.11 35.16	16.27 35.51	16.43 35.86	16.59 36.21	16.75 36.56	16.91 36.91	17.07 37.25	17.23 37.60	17.39 37.95
.11	17.55 38.30	17.70 38.65	17.86 39.00	18.02 39.34	18.18 39.69	18.34 40.04	18.50 40.39	18.66 40.74	18.82 41.08	18.98 41.43
.12	19.14 41.78	19.30 42.13	19.46 42.47	19.62 42.82	19.78 43.17	19.94 43.52	20.10 43.87	20.26 44.22	20.42 44.56	20.58 44.91
.13	20.74 45.26	20.90 45.61	21.05 45.96	21.21 46.30	21.37 46.65	21.53 47.00	21.69 47.35	21.85 47.70	22.01 48.05	22.17 48.39
.14	22.33 48.74	22.49 49.09	22.65 49.44	22.81 49.79	22.97 50.13	23.13 50.48	23.29 50.83	23.45 51.18	23.60 51.52	23.76 51.87
.15	23.93 52.22	24.08 52.57	24.24 52.92	24.40 53.27	24.56 53.62	24.72 53.96	24.88 54.31	25.04 54.66	25.20 55.01	25.36 55.36
.16	25.52 55.70	25.68 56.05	25.84 56.40	26.00 56.75	26.16 57.10	26.32 57.45	26.48 57.79	26.64 58.14	26.80 58.49	26.96 58.84
.17	27.12 59.19	27.28 59.53	27.43 59.88	27.59 60.23	27.75 60.58	27.91 60.93	28.07 61.28	28.23 61.62	28.39 61.97	28.55 62.32
.18	28.71 62.67	28.87 63.02	29.03 63.36	29.19 63.71	29.35 64.06	29.51 64.41	29.67 64.75	29.83 65.10	29.99 65.45	30.15 65.80
.19	30.31 66.14	30.46 66.49	30.62 66.84	30.78 67.19	30.94 67.54	31.10 67.89	31.26 68.24	31.42 68.58	31.58 68.93	31.74 69.28
.20	31.90 69.63	32.06 69.98	32.22 70.32	32.38 70.67	32.54 71.02	32.70 71.37	32.86 71.72	33.02 72.07	33.18 72.41	33.34 72.76
.21	33.50 73.11	33.65 73.46	33.81 73.80	33.98 74.15	34.13 74.50	34.29 74.85	34.45 75.20	34.61 75.55	34.77 75.89	34.93 76.24
.22	35.09 76.59	35.25 76.94	35.41 77.29	35.57 77.63	35.73 77.98	35.89 78.33	36.05 78.68	36.21 79.02	36.37 79.37	36.53 79.72
.23	36.69 80.07	36.84 80.42	37.00 80.77	37.16 81.12	37.32 81.46	37.48 81.81	37.64 82.16	37.80 82.51	37.96 82.86	38.12 83.20
.24	38.28 83.55	38.44 83.90	38.60 84.25	38.76 84.60	38.92 84.95	39.08 85.30	39.24 85.64	39.40 85.99	39.56 86.34	39.72 86.69
.25	39.88 87.04	40.03 87.38	40.19 87.73	40.35 88.08	40.51 88.43	40.67 88.77	40.83 89.12	40.99 89.47*	41.15 89.82	41.31 90.17

TABLE II.—PER CENT OF P_2O_5 CORRESPONDING TO WEIGHT OF $Mg_2P_2O_7$. CALCULATED FOR .4 Gram SUBSTANCE.

Wt. Gm.	0	1	2	3	4	5	6	7	8	9
.000	.00	.02	.03	.05	.06	.08	.10	.11	.13	.14
.001	.16	.18	.19	.21	.22	.24	.26	.27	.29	.30
.002	.32	.33	.35	.37	.38	.40	.41	.43	.45	.46
.003	.48	.49	.51	.53	.54	.56	.57	.59	.61	.62
.004	.64	.65	.67	.69	.70	.72	.73	.75	.77	.78
.005	.80	.81	.83	.85	.86	.88	.89	.91	.93	.94
.006	.96	.97	.99	1.00	1.02	1.04	1.05	1.07	1.08	1.10
.007	1.12	1.13	1.15	1.16	1.18	1.20	1.21	1.23	1.24	1.26
.008	1.28	1.29	1.31	1.32	1.34	1.36	1.37	1.39	1.40	1.42
.009	1.44	1.45	1.47	1.48	1.50	1.52	1.53	1.55	1.56	1.58
.010	1.60	1.61	1.63	1.64	1.66	1.67	1.69	1.71	1.72	1.74
.011	1.75	1.77	1.79	1.80	1.82	1.83	1.85	1.87	1.88	1.90
.012	1.91	1.93	1.95	1.96	1.98	1.99	2.01	2.03	2.04	2.06
.013	2.07	2.09	2.11	2.12	2.14	2.15	2.17	2.19	2.20	2.22
.014	2.23	2.25	2.27	2.28	2.30	2.31	2.33	2.34	2.36	2.38
.015	2.39	2.41	2.42	2.44	2.46	2.47	2.49	2.50	2.52	2.54
.016	2.55	2.57	2.58	2.60	2.62	2.63	2.65	2.66	2.68	2.70
.017	2.71	2.73	2.74	2.76	2.78	2.79	2.81	2.82	2.84	2.86
.018	2.87	2.89	2.90	2.92	2.93	2.95	2.97	2.98	3.00	3.01
.019	3.03	3.05	3.06	3.08	3.09	3.11	3.13	3.14	3.16	3.17
.020	3.19	3.21	3.22	3.24	3.25	3.27	3.29	3.30	3.32	3.33
.021	3.35	3.37	3.38	3.40	3.41	3.43	3.45	3.46	3.48	3.49
.022	3.51	3.52	3.54	3.56	3.57	3.59	3.60	3.62	3.64	3.65
.023	3.67	3.68	3.70	3.72	3.73	3.75	3.76	3.78	3.80	3.81
.024	3.83	3.84	3.86	3.88	3.89	3.91	3.92	3.94	3.96	3.97
.025	3.99	4.00	4.02	4.04	4.05	4.07	4.08	4.10	4.12	4.13
.026	4.15	4.16	4.18	4.19	4.21	4.23	4.24	4.26	4.27	4.29
.027	4.31	4.32	4.34	4.35	4.37	4.39	4.40	4.42	4.43	4.45
.028	4.47	4.48	4.50	4.51	4.53	4.55	4.56	4.58	4.59	4.61
.029	4.63	4.64	4.66	4.67	4.69	4.71	4.72	4.74	4.75	4.77
.030	4.78	4.80	4.82	4.83	4.85	4.86	4.88	4.90	4.91	4.93
.031	4.94	4.96	4.98	4.99	5.01	5.02	5.04	5.06	5.07	5.09
.032	5.10	5.12	5.14	5.15	5.17	5.18	5.20	5.22	5.23	5.25
.033	5.26	5.28	5.30	5.31	5.33	5.34	5.36	5.38	5.39	5.41
.034	5.42	5.44	5.45	5.47	5.49	5.50	5.52	5.53	5.55	5.57
.035	5.58	5.60	5.61	5.63	5.65	5.66	5.68	5.69	5.71	5.73
.036	5.74	5.76	5.77	5.79	5.81	5.82	5.84	5.85	5.87	5.89
.037	5.90	5.92	5.93	5.95	5.97	5.98	6.00	6.01	6.03	6.05
.038	6.06	6.08	6.09	6.11	6.12	6.14	6.16	6.17	6.19	6.20
.039	6.22	6.24	6.25	6.27	6.28	6.30	6.32	6.33	6.35	6.36
.040	6.38	6.40	6.41	6.43	6.44	6.46	6.48	6.49	6 51	6.52
.041	6.54	6.56	6.57	6.59	6.60	6.62	6.64	6.65	6.67	6.68
.042	6.70	6.71	6.73	6.75	6.76	6.78	6.79	6.81	6.83	6.84
.043	6.86	6.87	6.89	6.91	6.92	6.94	6.95	6.97	6.99	7.00
.044	7.02	7.03	7.05	7.07	7.08	7.10	7.11	7.13	7.15	7.16
.045	7.18	7.19	7.21	7.23	7.24	7.26	7.27	7.29	7.30	7.32
.046	7.34	7.35	7.37	7.38	7.40	7.42	7.43	7.45	7.46	7.48
.047	7.50	7.51	7.53	7.54	7.56	7.58	7.59	7.61	7.62	7.64
.048	7.66	7.67	7.69	7.70	7.72	7.73	7.75	7.77	7.78	7.80
.049	7.81	7.83	7.85	7.86	7.88	7.89	7.91	7.93	7.94	7.96

TABLE II.—CONTINUED. PER CENT OF P_2O_5 CORRESPONDING TO WEIGHT OF $Mg_2P_2O_7$. CALCULATED FOR .4 Gram SUBSTANCE.

Wt. Gm.	0	1	2	3	4	5	6	7	8	9
.050	7.97	7.99	8.01	8.02	8.04	8.05	8.07	8.09	8.10	8.12
.051	8.13	8.15	8.17	8.18	8.20	8.21	8.23	8.25	8.26	8.28
.052	8.29	8.31	8.33	8.34	8.36	8.37	8.39	8.41	8.42	8.44
.053	8.45	8.47	8.49	8.50	8.52	8.53	8.55	8.56	8.58	8.60
.054	8.61	8.63	8.64	8.66	8.68	8.69	8.71	8.72	8.74	8.76
.055	8.77	8.79	8.80	8.82	8.84	8.85	8.87	8.88	8.90	8.92
.056	8.93	8.95	8.96	8.98	9.00	9.01	9.03	9.04	9.06	9.08
.057	9.09	9.11	9.12	9.14	9.15	9.17	9.19	9.20	9.22	9.23
.058	9.25	9.27	9.28	9.30	9.31	9.33	9.35	9.36	9.38	9.39
.059	9.41	9.43	9.44	9.46	9.47	9.49	9.51	9.52	9.54	9.55
.060	9.57	9.59	9.60	9.62	9.63	9.65	9.67	9.68	9.70	9.71
.061	9.73	9.74	9.76	9.78	9.79	9.81	9.82	9.84	9.86	9.87
.062	9.89	9.90	9.92	9.94	9.95	9.97	9.98	10.00	10.02	10.03
.063	10.05	10.06	10.08	10.10	10.11	10.13	10.14	10.16	10.18	10.19
.064	10.21	10.22	10.24	10.26	10.27	10.29	10.30	10.32	10.33	10.35
.065	10.37	10.38	10.40	10.41	10.43	10.45	10.46	10.48	10.49	10.51
.066	10.53	10.54	10.56	10.57	10.59	10.61	10.62	10.64	10.65	10.67
.067	10.69	10.70	10.72	10.73	10.75	10.77	10.78	10.80	10.81	10.83
.068	10.85	10.86	10.88	10.89	10.91	10.93	10.94	10.96	10.97	10.99
.069	11.01	11.02	11.04	11.05	11.07	11.09	11.10	11.12	11.13	11.15
.070	11.16	11.18	11.20	11.21	11.23	11.24	11.26	11.28	11.29	11.31
.071	11.32	11.34	11.36	11.37	11.39	11.40	11.42	11.44	11.45	11.47
.072	11.48	11.50	11.52	11.53	11.55	11.56	11.58	11.60	11.61	11.63
.073	11.64	11.66	11.68	11.69	11.71	11.72	11.74	11.76	11.77	11.79
.074	11.80	11.82	11.83	11.85	11.87	11.88	11.90	11.91	11.93	11.95
.075	11.96	11.98	11.99	12.01	12.03	12.04	12.06	12.07	12.09	12.11
.076	12.12	12.14	12.15	12.17	12.19	12.20	12.22	12.23	12.25	12.27
.077	12.28	12.30	12.31	12.33	12.34	12.36	12.38	12.39	12.41	12.43
.078	12.44	12.46	12.47	12.49	12.50	12.52	12.54	12.55	12.57	12.58
.079	12.60	12.62	12.63	12.65	12.66	12.68	12.70	12.71	12.73	12.74
.080	12.76	12.78	12.79	12.81	12.82	12.84	12.86	12.87	12.89	12.90
.081	12.92	12.94	12.95	12.97	12.98	13.00	13.02	13.03	13.05	13.06
.082	13.08	13.09	13.11	13.13	13.14	13.16	13.17	13.19	13.21	13.22
.083	13.24	13.25	13.27	13.29	13.30	13.32	13.33	13.35	13.37	13.38
.084	13.40	13.41	13.43	13.45	13.46	13.48	13.49	13.51	13.53	13.54
.085	13.56	13.57	13.59	13.61	13.62	13.64	13.65	13.67	13.69	13.70
.086	13.72	13.73	13.75	13.76	13.78	13.80	13.81	13.83	13.84	13.86
.087	13.88	13.89	13.91	13.92	13.94	13.96	13.97	13.99	14.00	14.02
.088	14.04	14.05	14.07	14.08	14.10	14.12	14.13	14.15	14.16	14.18
.089	14.20	14.21	14.23	14.24	14.26	14.28	14.29	14.31	14.32	14.34
.090	14.36	14.37	14.39	14.40	14.42	14.44	14.45	14.47	14.48	14.50
.091	14.51	14.53	14.55	14.56	14.58	14.60	14.61	14.63	14.64	14.66
.092	14.67	14.69	14.71	14.72	14.74	14.75	14.77	14.79	14.80	14.82
.093	14.83	14.85	14.87	14.88	14.90	14.91	14.93	14.95	14.96	14.98
.094	14.99	15.01	15.03	15.04	15.06	15.07	15.09	15.11	15.12	15.14
.095	15.15	15.17	15.19	15.20	15.22	15.23	15.25	15.26	15.28	15.30
.096	15.31	15.33	15.34	15.36	15.38	15.39	15.41	15.42	15.44	15.46
.097	15.47	15.49	15.50	15.52	15.54	15.55	15.57	15.58	15.60	15.62
.098	15.63	15.65	15.66	15.68	15.70	15.71	15.73	15.74	15.76	15.78
.099	15.79	15.81	15.82	15.84	15.86	15.87	15.89	15.90	15.92	15.94

TABLE II, CONTINUED.—PER CENT OF P_2O_5 CORRESPONDING TO WEIGHT OF $Mg_2P_2O_7$. CALCULATED FOR .4 Gram SUBSTANCE.

Wt. Gm.	0	1	2	3	4	5	6	7	8	9
.100	15.95	15.97	15.98	16.00	16.01	16.03	16.05	16.06	16.08	16.09
.101	16.11	16.13	16.14	16.16	16.17	16.19	16.21	16.22	16.24	16.25
.102	16.27	16.29	16.30	16.32	16.33	16.35	16.37	16.38	16.40	16.41
.103	16.43	16.45	16.46	16.48	16.49	16.51	16.53	16.54	16.56	16.57
.104	16.59	16.60	16.62	16.64	16.65	16.67	16.68	16.70	16.72	16.73
.105	**16.75**	**16.76**	**16.78**	**16.80**	**16.81**	**16.83**	**16.84**	**16.86**	**16.88**	**16.89**
.106	16.91	16.92	16.94	16.96	16.97	16.99	17.00	17.02	17.04	17.05
.107	17.07	17.08	17.10	17.12	17.13	17.15	17.16	17.18	17.20	17.21
.108	17.23	17.24	17.26	17.27	17.29	17.31	17.32	17.34	17.35	17.37
.109	17.39	17.40	17.42	17.43	17.45	17.47	17.48	17.50	17.51	17.53
.110	**17.55**	**17.56**	**17.58**	**17.59**	**17.61**	**17.63**	**17.64**	**17.66**	**17.67**	**17.69**
.111	17.70	17.72	17.74	17.75	17.77	17.79	17.80	17.82	17.83	17.85
.112	17.86	17.88	17.90	17.91	17.93	17.94	17.96	17.98	17.99	18.01
.113	18.02	18.04	18.06	18.07	18.09	18.10	18.12	18.14	18.15	18.17
.114	18.18	18.20	18.22	18.23	18.25	18.26	18.28	18.30	18.31	18.33
.115	**18.34**	**18.36**	**18.38**	**18.39**	**18.41**	**18.42**	**18.44**	**18.46**	**18.47**	**18.49**
.116	18.50	18.52	18.54	18.55	18.57	18.58	18.60	18.61	18.63	18.65
.117	18.66	18.68	18.69	18.71	18.73	18.74	18.76	18.77	18.79	18.80
.118	18.82	18.84	18.85	18.87	18.88	18.90	18.92	18.93	18.95	18.96
.119	18.98	19.00	19.01	19.03	19.05	19.06	19.08	19.09	19.11	19.12
.120	**19.14**	**19.16**	**19.17**	**19.19**	**19.20**	**19.22**	**19.24**	**19.25**	**19.27**	**19.28**
.121	19.30	19.32	19.33	19.35	19.36	19.38	19.40	19.41	19.43	19.44
.122	19.46	19.47	19.49	19.51	19.52	19.54	19.55	19.57	19.58	19.60
.123	19.62	19.63	19.65	19.67	19.68	19.70	19.71	19.73	19.75	19.76
.124	19.78	19.79	19.81	19.83	19.84	19.86	19.87	19.89	19.91	19.92
.125	**19.94**	**19.95**	**19.97**	**19.99**	**20.00**	**20.02**	**20.03**	**20.05**	**20.07**	**20.08**
.126	20.10	20.11	20.13	20.15	20.16	20.18	20.19	20.21	20.23	20.24
.127	20.26	20.27	20.29	20.31	20.32	20.34	20.35	20.37	20.39	20.40
.128	20.42	20.43	20.45	20.47	20.48	20.50	20.51	20.53	20.54	20.56
.129	20.58	20.59	20.61	20.62	20.64	20.66	20.67	20.69	20.70	20.72
.130	**20.74**	**20.75**	**20.77**	**20.78**	**20.80**	**20.82**	**20.83**	**20.85**	**20.86**	**20.88**
.131	20.90	20.91	20.93	20.94	20.96	20.97	20.99	21.01	21.02	21.04
.132	21.05	21.07	21.09	21.10	21.12	21.13	21.15	21.17	21.18	21.20
.133	21.21	21.23	21.25	21.26	21.28	21.29	21.31	21.33	21.34	21.36
.134	21.37	21.39	21.40	21.42	21.44	21.45	21.47	21.48	21.50	21.52
.135	**21.53**	**21.55**	**21.56**	**21.58**	**21.60**	**21.61**	**21.63**	**21.64**	**21.66**	**21.68**
.136	21.69	21.71	21.72	21.74	21.76	21.77	21.79	21.80	21.82	21.84
.137	21.85	21.87	21.88	21.90	21.92	21.93	21.95	21.96	21.98	22.00
.138	22.01	22.03	22.04	22.06	22.07	22.09	22.11	22.12	22.14	22.15
.139	22.17	22.19	22.20	22.22	22.23	22.25	22.27	22.28	22.30	22.31
.140	**22.33**	**22.35**	**22.36**	**22.38**	**22.39**	**22.41**	**22.43**	**22.44**	**22.46**	**22.47**
.141	22.49	22.51	22.52	22.54	22.55	22.57	22.59	22.60	22.62	22.63
.142	22.65	22.67	22.68	22.70	22.71	22.73	22.75	22.76	22.78	22.79
.143	22.81	22.83	22.84	22.86	22.87	22.89	22.90	22.92	22.94	22.95
.144	22.97	22.98	23.00	23.02	23.03	23.05	23.07	23.08	23.10	23.11
.145	**23.13**	**23.14**	**23.16**	**23.18**	**23.19**	**23.21**	**23.22**	**23.24**	**23.26**	**23.27**
.146	23.29	23.30	23.32	23.34	23.35	23.37	23.38	23.40	23.41	23.43
.147	23.45	23.46	23.48	23.49	23.51	23.52	23.54	23.56	23.57	23.59
.148	23.60	23.62	23.64	23.65	23.67	23.68	23.70	23.72	23.73	23.75
.149	23.76	23.78	23.80	23.81	23.83	23.84	23.86	23.88	23.89	23.91

TABLE II CONTINUED. PER CENT OF P_2O_5 CORRESPONDING TO WEIGHT OF $Mg_2P_2O_7$. CALCULATED FOR .4 Gram SUBSTANCE.

Gm.	0	1	2	3	4	5	6	7	8	9
.150	23.93	23.94	23.96	23.97	23.99	24.00	24.02	24.04	24.05	24.07
.151	24.08	24.10	24.12	24.13	24.15	24.16	24.18	24.20	24.21	24.23
.152	24.24	24.26	24.27	24.29	24.31	24.32	24.34	24.35	24.37	24.39
.153	24.40	24.42	24.43	24.45	24.47	24.48	24.50	24.52	24.53	24.55
.154	24.56	24.58	24.59	24.61	24.63	24.64	24.66	24.67	24.69	24.71
.155	24.72	24.74	24.75	24.77	24.79	24.80	24.82	24.83	24.85	24.87
.156	24.88	24.90	24.91	24.93	24.95	24.96	24.98	24.99	25.01	25.03
.157	25.04	25.06	25.07	25.09	25.11	25.12	25.14	25.15	25.17	25.19
.158	25.20	25.22	25.23	25.25	25.27	25.28	25.30	25.31	25.33	25.35
.159	25.36	25.38	25.39	25.41	25.42	25.44	25.46	25.47	25.49	25.51
.160	25.52	25.54	25.55	25.57	25.58	25.60	25.62	25.63	25.65	25.66
.161	25.68	25.70	25.71	25.73	25.74	25.76	25.78	25.79	25.81	25.82
.162	25.84	25.86	25.87	25.89	25.90	25.92	25.93	25.95	25.97	25.98
.163	26.00	26.01	26.03	26.05	26.06	26.08	26.09	26.11	26.13	26.14
.164	26.16	26.17	26.19	26.21	26.22	26.24	26.25	26.27	26.29	26.30
.165	26.32	26.33	26.35	26.36	26.38	26.40	26.41	26.43	26.44	26.46
.166	26.48	26.49	26.51	26.52	26.54	26.56	26.57	26.59	26.60	26.62
.167	26.64	26.65	26.67	26.68	26.70	26.72	26.73	26.75	26.76	26.78
.168	26.80	26.81	26.83	26.84	26.86	26.88	26.89	26.91	26.92	26.94
.169	26.96	26.97	26.99	27.00	27.02	27.04	27.05	27.07	27.08	27.10
.170	27.12	27.13	27.15	27.16	27.18	27.20	27.21	27.23	27.24	27.26
.171	27.28	27.29	27.31	27.32	27.34	27.35	27.37	27.39	27.40	27.42
.172	27.43	27.45	27.47	27.48	27.50	27.51	27.53	27.55	27.56	27.58
.173	27.59	27.61	27.63	27.64	27.66	27.67	27.69	27.71	27.72	27.74
.174	27.75	27.77	27.78	27.80	27.82	27.83	27.85	27.87	27.88	27.90
.175	27.91	27.93	27.94	27.96	27.98	27.99	28.01	28.02	28.04	28.06
.176	28.07	28.09	28.10	28.12	28.14	28.15	28.17	28.18	28.20	28.22
.177	28.23	28.25	28.26	28.28	28.30	28.31	28.33	28.34	28.36	28.38
.178	28.39	28.41	28.42	28.44	28.46	28.47	28.49	28.50	28.52	28.54
.179	28.55	28.57	28.58	28.60	28.62	28.63	28.65	28.66	28.68	28.69
.180	28.71	28.73	28.74	28.76	28.77	28.79	28.81	28.82	28.84	28.85
.181	28.87	28.89	28.90	28.92	28.93	28.95	28.97	28 98	29.00	29.01
.182	29.03	29.05	29.06	29.08	29.09	29.11	29.13	29.14	29.16	29.17
.183	29.19	29.20	29.22	29.24	29.25	29.27	29.28	29.30	29.32	29.33
.184	29.35	29.36	29.38	29.40	29.41	29.43	29.44	29.46	29.48	29.49
.185	29.51	29.52	29.54	29.56	29.57	29.59	29.60	29.62	29.64	29.65
.186	29.67	29.68	29.70	29.71	29.73	29.75	29.76	29.78	29.79	29.81
.187	29.83	29.84	29.86	29.87	29.89	29.91	29.92	29.94	29.95	29.97
.188	29.99	30.00	30.02	30.03	30.05	30.07	30.08	30.10	30.11	30.13
.189	30.15	30.16	30.18	30.19	30.21	30.23	30.24	30.26	30.27	30.29
.190	30.31	30.32	30.34	30.35	30.37	30.38	30.40	30.42	30.43	30.45
.191	30.46	30.48	30.50	30.51	30.53	30.54	30.56	30.58	30.59	30.61
.192	30.62	30.64	30.66	30.67	30.69	30.70	30.72	30.74	30.75	30.77
.193	30.78	30.80	30.82	30.83	30.85	30.86	30.88	30.90	30.91	30.93
.194	30.94	30.96	30.97	30.99	31.01	31.02	31.04	31.05	31.07	31.09
.195	31.10	31.12	31.13	31.15	31.17	31.18	31.20	31.21	31.23	31.25
.196	31.26	31.28	31.29	31.31	31.33	31.34	31.36	31.37	31.39	31.41
.197	31.42	31.44	31.45	31.47	31.49	31.50	31.52	31.53	31.55	31.57
.198	31.58	31.60	31.61	31.63	31.65	31.66	31.68	31.69	31.71	31.73
.199	31.74	31.76	31.77	31.79	31.81	31.82	31.84	31.85	31.87	31.89

TABLE III.—PER CENT OF K_2O CORRESPONDING TO WEIGHT OF K_2PtCl_6. CALCULATED FOR 1 gram substance.

Wt.	0	1	2	3	4	5	6	7	8	9
.00	.00	.02	.04	.06	.08	.10	.12	.14	.15	.17
.01	.19	.21	.23	.25	.27	.29	.31	.33	.35	.37
.02	.39	.41	.42	.44	.46	.48	.50	.52	.54	.56
.03	.58	.60	.62	.64	.66	.68	.69	.71	.73	.75
.04	.77	.79	.81	.83	.85	.87	.89	.91	.93	.95
.05	.97	.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14
.06	1.16	1.18	1.20	1.22	1.24	1.25	1.27	1.29	1.31	1.33
.07	1.35	1.37	1.39	1.41	1.43	1.45	1.47	1.49	1.51	1.52
.08	1.54	1.56	1.58	1.60	1.62	1.64	1.66	1.68	1.70	1.72
.09	1.74	1.76	1.78	1.80	1.81	1.83	1.85	1.87	1.89	1.91
.10	1.93	1.95	1.97	1.99	2.01	2.03	2.05	2.07	2.08	2.10
.11	2.12	2.14	2.16	2.18	2.20	2.22	2.24	2.26	2.28	2.30
.12	2.32	2.34	2.35	2.37	2.39	2.41	2.43	2.45	2.47	2.49
.13	2.51	2.53	2.55	2.57	2.59	2.61	2.62	2.64	2.66	2.68
.14	2.70	2.72	2.74	2.76	2.78	2.80	2.82	2.84	2.86	2.88
.15	2.90	2.91	2.93	2.95	2.97	2.99	3.01	3.03	3.05	3.07
.16	3.09	3.11	3.13	3.15	3.17	3.18	3.20	3.22	3.24	3.26
.17	3.28	3.30	3.32	3.34	3.36	3.38	3.40	3.42	3.44	3.45
.18	3.47	3.49	3.51	3.53	3.55	3.57	3.59	3.61	3.63	3.65
.19	3.67	3.69	3.71	3.73	3.74	3.76	3.78	3.80	3.82	3.84
.20	3.86	3.88	3.90	3.92	3.94	3.96	3.98	4.00	4.01	4.03
.21	4.05	4.07	4.09	4.11	4.13	4.15	4.17	4.19	4.21	4.23
.22	4.25	4.27	4.28	4.30	4.32	4.34	4.36	4.38	4.40	4.42
.23	4.44	4.46	4.48	4.50	4.52	4.54	4.55	4.57	4.59	4.61
.24	4.63	4.65	4.67	4.69	4.71	4.73	4.75	4.77	4.79	4.81
.25	4.83	4.84	4.86	4.88	4.90	4.92	4.94	4.96	4.98	5.00
.26	5.02	5.04	5.06	5.08	5.10	5.11	5.13	5.15	5.17	5.19
.27	5.21	5.23	5.25	5.27	5.29	5.31	5.33	5.35	5.37	5.38
.28	5.40	5.42	5.44	5.46	5.48	5.50	5.52	5.54	5.56	5.58
.29	5.60	5.62	5.64	5.66	5.67	5.69	5.71	5.73	5.75	5.77
.30	5.79	5.81	5.83	5.85	5.87	5.89	5.91	5.93	5.94	5.96
.31	5.98	6.00	6.02	6.04	6.06	6.08	6.10	6.12	6.14	6.16
.32	6.18	6.20	6.21	6.23	6.25	6.27	6.29	6.31	6.33	6.35
.33	6.37	6.39	6.41	6.43	6.45	6.47	6.48	6.50	6.52	6.54
.34	6.56	6.58	6.60	6.62	6.64	6.66	6.68	6.70	6.72	6.74
.35	6.76	6.77	6.79	6.81	6.83	6.85	6.87	6.89	6.91	6.93
.36	6.95	6.97	6.99	7.01	7.03	7.04	7.06	7.08	7.10	7.12
.37	7.14	7.16	7.18	7.20	7.22	7.24	7.26	7.28	7.30	7.31
.38	7.33	7.35	7.37	7.39	7.41	7.43	7.45	7.47	7.49	7.51
.39	7.53	7.55	7.57	7.59	7.60	7.62	7.64	7.66	7.68	7.70
.40	7.72	7.74	7.76	7.78	7 80	7.82	7.84	7.86	7.87	7.89
.41	7.91	7.93	7.95	7.97	7.99	8.01	8.03	8.05	8.07	8.09
.42	8.11	8.13	8.14	8.16	8.18	8.20	8.22	8.24	8.26	8.28
.43	8.30	8.32	8.34	8.36	8.38	8.40	8.41	8.43	8.45	8.47
.44	8.49	8.51	8.53	8.55	8.57	8.59	8.61	8.63	8.65	8.67
.45	8.69	8.70	8.72	8.74	8.76	8.78	8.80	8.82	8.84	8.86
.46	8.88	8.90	8.92	8.94	8.96	8.97	8.99	9.01	9.03	9.05
.47	9.07	9.09	9.11	9.13	9.15	9.17	9.19	9.21	9.23	9.25
.48	9.26	9.28	9.30	9.32	9.34	9.36	9.38	9.40	9.42	9.44
.49	9.46	9.48	9.50	9.52	9.53	9.55	9.57	9.59	9.61	9.63

TABLE III. CONTINUED.—PER CENT OF K_2O CORRESPONDING TO WEIGHT OF K_2PtCl_6. CALCULATED FOR 1 Gram SUBSTANCE.

Wt.	0	1	2	3	4	5	6	7	8	9
.50	9.65	9.67	9.69	9.71	9.73	9.75	9.77	9.79	9.80	9.82
.51	9.84	9.86	9.88	9.90	9.92	9.94	9.96	9.98	10.00	10.02
.52	10.04	10.06	10.07	10.09	10.11	10.13	10.15	10.17	10.19	10.21
.53	10.23	10.25	10.27	10.29	10.31	10.33	10.34	10.36	10.38	10.40
.54	10.42	10.44	10.46	10.48	10.50	10.52	10.54	10.56	10.58	10.60
.55	10.62	10.63	10.65	10.67	10.69	10.71	10.73	10.75	10.77	10.79
.56	10.81	10.83	10.85	10.87	10.89	10.90	10.92	10.94	10.96	10.98
.57	11.00	11.02	11.04	11.06	11.08	11.10	11.12	11.14	11.16	11.17
.58	11.19	11.21	11.23	11.25	11.27	11.29	11.31	11.33	11.35	11.37
.59	11.39	11.41	11.43	11.45	11.46	11.48	11.50	11.52	11.54	11.56
.60	11.58	11.60	11.62	11.64	11.66	11.68	11.70	11.72	11.74	11.76
.61	11.78	11.80	11.82	11.84	11.86	11.87	11.89	11.91	11.93	11.95
.62	11.97	11.99	12.01	12.03	12.05	12.07	12.09	12.11	12.13	12.14
.63	12.16	12.18	12.20	12.22	12.24	12.26	12.28	12.30	12.32	12.34
.64	12.36	12.38	12.40	12.42	12.43	12.45	12.47	12.49	12.51	12.53
.65	12.55	12.57	12.59	12.61	12.63	12.65	12.67	12.69	12.70	12.72
.66	12.74	12.76	12.78	12.80	12.82	12.84	12.86	12.88	12.90	12.92
.67	12.94	12.96	12.98	12.99	13.01	13.03	13.05	13.07	13.09	13.11
.68	13.13	13.15	13.17	13.19	13.21	13.23	13.24	13.26	13.28	13.30
.69	13.32	13.34	13.36	13.38	13.40	13.42	13.44	13.46	13.48	13.50
.70	13.52	13.53	13.55	13.57	13.59	13.61	13.63	13.65	13.67	13.69
.71	13.71	13.73	13.75	13.77	13.79	13.81	13.82	13.84	13.86	13.88
.72	13.90	13.92	13.94	13.96	13.98	14.00	14.02	14.04	14.06	14.08
.73	14.09	14.11	14.13	14.15	14.17	14.19	14.21	14.23	14.25	14.27
.74	14.29	14.31	14.33	14.35	14.37	14.38	14.40	14.42	14.44	14.46
.75	14.48	14.50	14.52	14.54	14.56	14.58	14.60	14.62	14.64	14.65
.76	14.67	14.69	14.71	14.73	14.75	14.77	14.79	14.81	14.83	14.85
.77	14.87	14.89	14.91	14.93	14.94	14.96	14.98	15.00	15.02	15.04
.78	15.06	15.08	15.10	15.12	15.14	15.16	15.18	15.20	15.21	15.23
.79	15.25	15.27	15.29	15.31	15.33	15.35	15.37	15.39	15.41	15.43
.80	15.45	15.47	15.49	15.50	15.52	15.54	15.56	15.58	15.60	15.62
.81	15.64	15.66	15.68	15.70	15.72	15.74	15.76	15.77	15.79	15.81
.82	15.83	15.85	15.87	15.89	15.91	15.93	15.95	15.97	15.99	16.01
.83	16.03	16.05	16.07	16.08	16.10	16.12	16.14	16.16	16.18	16.20
.84	16.22	16.24	16.26	16.28	16.30	16.32	16.33	16.35	16.37	16.39
.85	16.41	16.43	16.45	16.47	16.49	16.51	16.53	16.55	16.57	16.59
.86	16.60	16.62	16.64	16.66	16.68	16.70	16.72	16.74	16.76	16.78
.87	16.80	16.82	16.84	16.86	16.88	16.89	16.91	16.93	16.95	16.97
.88	16.99	17.01	17.03	17.05	17.07	17.09	17.11	17.13	17.15	17.16
.89	17.18	17.20	17.22	17.24	17.26	17.28	17.30	17.32	17.34	17.36
.90	17.38	17.40	17.42	17.44	17.45	17.47	17.49	17.51	17.53	17.55
.91	17.57	17.59	17.61	17.63	17.65	17.67	17.69	17.71	17.72	17.74
.92	17.76	17.78	17.80	17.82	17.84	17.86	17.88	17.90	17.92	17.94
.93	17.96	17.98	18.00	18.01	18.03	18.05	18.07	18.09	18.11	18.13
.94	18.15	18.17	18.19	18.21	18.23	18.25	18.27	18.28	18.30	18.32
.95	18.34	18.36	18.38	18.40	18.42	18.44	18.46	18.48	18.50	18.52
.96	18.54	18.55	18.57	18.59	18.61	18.63	18.65	18.67	18.69	18.71
.97	18.73	18.75	18.77	18.79	18.81	18.83	18.84	18.86	18.88	18.90
.98	18.92	18.94	18.96	18.98	19.00	19.02	19.04	19.06	19.08	19.10
.99	19.11	19.13	19.15	19.17	19.19	19.21	19.23	19.25	19.27	19.29

TABLE IV.—PER CENT OF N CORRESPONDING TO CUBIC CENTIMETERS OF ONE-TENTH NORMAL ALKALI. CALCULATED FOR 1 Gram SUBSTANCE.

C. C. 1-10 N. Alk.	0	1	2	3	4	5	6	7	8	9
0.	0.00	.01	.03	.04	.06	.07	.08	.10	.11	.13
1.	.14	.15	.17	.18	.20	.21	.22	.24	.25	.27
2.	.28	.29	.31	.32	.34	.35	.36	.38	.39	.41
3.	.42	.43	.45	.46	.48	.49	.51	.52	.53	.55
4.	.56	.58	.59	.60	.62	.63	.65	.66	.67	.69
5.	.70	.72	.73	.74	.76	.77	.79	.80	.81	.83
6.	.84	.86	.87	.88	.90	.91	.93	.94	.95	.97
7.	.98	1.00	1.01	1.02	1.04	1.05	1.07	1.08	1.09	1.11
8.	1.12	1.14	1.15	1.16	1.18	1.19	1.21	1.22	1.23	1.25
9.	1.26	1.28	1.29	1.30	1.32	1.33	1.35	1.36	1.37	1.39
10.	1.40	1.42	1.43	1.45	1.46	1.47	1.49	1.50	1.52	1.53
11.	1.54	1.56	1.57	1.59	1.60	1.61	1.63	1.64	1.66	1.67
12.	1.68	1.70	1.71	1.73	1.74	1.75	1.77	1.78	1.80	1.81
13.	1.82	1.84	1.85	1.87	1.88	1.89	1.91	1.92	1.94	1.95
14.	1.96	1.98	1.99	2.01	2.02	2.03	2.05	2.06	2.08	2.09
15.	2.10	2.12	2.13	2.15	2.16	2.17	2.19	2.20	2.22	2.23
16.	2.24	2.26	2.27	2.29	2.30	2.31	2.33	2.34	2.36	2.37
17.	2.39	2.40	2.41	2.43	2.44	2.46	2.47	2.48	2.50	2.51
18.	2.53	2.54	2.55	2.57	2.58	2.60	2.61	2.62	2.64	2.65
19.	2.67	2.68	2.69	2.71	2.72	2.74	2.75	2.76	2.78	2.79
20.	2.81	2.82	2.83	2.85	2.86	2.88	2.89	2.90	2.92	2.93
21.	2.95	2.96	2.97	2.99	3.00	3.02	3.03	3.04	3.06	3.07
22.	3.09	3.10	3.11	3.13	3.14	3.16	3.17	3.18	3.20	3.21
23.	3.23	3.24	3.25	3.27	3.28	3.30	3.31	3.32	3.34	3.35
24.	3.37	3.38	3.40	3.41	3.42	3.44	3.45	3.47	3.48	3.49
25.	3.51	3.52	3.54	3.55	3.56	3.58	3.59	3.61	3.62	3.63
26.	3.65	3.66	3.68	3.69	3.70	3.72	3.73	3.75	3.76	3.77
27.	3.79	3.80	3.82	3.83	3.84	3.86	3.87	3.89	3.90	3.91
28.	3.93	3.94	3.96	3.97	3.98	4.00	4.01	4.03	4.04	4.05
29.	4.07	4.08	4.10	4.11	4.12	4.14	4.15	4.17	4.18	4.19
30.	4.21	4.22	4.24	4.25	4.26	4.28	4.29	4.31	4.32	4.34
31.	4.35	4.36	4.38	4.39	4.40	4.42	4.43	4.45	4.46	4.48
32.	4.49	4.50	4.52	4.53	4.55	4.56	4.57	4.59	4.60	4.62
33.	4.63	4.64	4.66	4.67	4.69	4.70	4.71	4.73	4.74	4.76
34.	4.77	4.78	4.80	4.81	4.83	4.84	4.85	4.87	4.88	4.90
35.	4.91	4.92	4.94	4.95	4.97	4.98	4.99	5.01	5.02	5.04
36.	5.05	5.06	5.08	5.09	5.11	5.12	5.13	5.15	5.16	5.18
37.	5.19	5.21	5.22	5.23	5.25	5.26	5.28	5.29	5.30	5.32
38.	5.33	5.35	5.36	5.37	5.39	5.40	5.42	5.43	5.44	5.46
39.	5.47	5.49	5.50	5.51	5.53	5.54	5.56	5.57	5.58	5.60
40.	5.61	5.63	5.64	5.65	5.67	5.68	5.70	5.71	5.72	5.74
41.	5.75	5.77	5.78	5.79	5.81	5.82	5.84	5.85	5.86	5.88
42.	5.89	5.91	5.92	5.93	5.95	5.96	5.98	5.99	6.00	6.02
43.	6.03	6.05	6.06	6.08	6.09	6.10	6.12	6.13	6.14	6.16
44.	6.17	6.19	6.20	6.22	6.23	6.24	6.26	6.27	6.29	6.30
45.	6.31	6.33	6.34	6.36	6.37	6.38	6.40	6.41	6.43	6.44
46.	6.45	6.47	6.48	6.50	6.51	6.52	6.54	6.55	6.57	6.58
47.	6.59	6.61	6.62	6.64	6.65	6.66	6.68	6.69	6.71	6.72
48.	6.73	6.75	6.76	6.78	6.79	6.80	6.82	6.83	6.85	6.86
49.	6.87	6.89	6.90	6.92	6.93	6.94	6.96	6.97	6.99	7.00

TABLE V.—PER CENT OF NH_3 CORRESPONDING TO CUBIC CENTIMETERS OF ONE TENTH NORMAL ALKALI. CALCULATED FOR 1 Gram SUBSTANCE.

C. C. 1-10 N. Alk.	0	1	2	3	4	5	6	7	8	9
0.	.00	.02	.03	.05	.07	.09	.10	.12	.14	.15
1.	.17	.19	.20	.22	.24	.26	.27	.29	.31	.32
2.	.34	.36	.37	.39	.41	.43	.44	.46	.48	.50
3.	.51	.53	.55	.56	.58	.60	.61	.63	.65	.67
4.	.68	.70	.72	.73	.75	.77	.78	.80	.82	.84
5.	.85	.87	.89	.90	.92	.94	.96	.97	.99	1.01
6.	1.02	1.04	1.06	1.07	1.09	1.11	1.13	1.14	1.16	1.18
7.	1.19	1.21	1.23	1.24	1.26	1.28	1.30	1.31	1.33	1.35
8.	1.36	1.38	1.40	1.42	1.43	1.45	1.47	1.48	1.50	1.52
9.	1.53	1.55	1.57	1.59	1.60	1.62	1.64	1.65	1.67	1.69
10.	1.71	1.72	1.74	1.76	1.77	1.79	1.81	1.82	1.84	1.86
11.	1.88	1.89	1.91	1.93	1.94	1.96	1.98	2.00	2.01	2.03
12.	2.05	2.06	2.08	2.10	2.11	2.13	2.15	2.17	2.18	2.20
13.	2.22	2.23	2.25	2.27	2.29	2.30	2.32	2.34	2.35	2.37
14.	2.39	2.40	2.42	2.44	2.46	2.47	2.49	2.51	2.52	2.54
15.	2.56	2.58	2.59	2.61	2.63	2.64	2.66	2.68	2.69	2.71
16.	2.73	2.75	2.76	2.78	2.80	2.81	2.83	2.85	2.87	2.88
17.	2.90	2.92	2.93	2.95	2.97	2.98	3.00	3.02	3.04	3.05
18.	3.07	3.09	3.10	3.12	3.14	3.15	3.17	3.19	3.21	3.22
19.	3.24	3.26	3.27	3.29	3.31	3.33	3.34	3.36	3.38	3.39
20.	3.41	3.43	3.44	3.46	3.48	3.50	3.51	3.53	3.55	3.56
21.	3.58	3.60	3.62	3.63	3.65	3.67	3.68	3.70	3.72	3.73
22.	3.75	3.77	3.79	3.80	3.82	3.84	3.85	3.87	3.89	3.91
23.	3.92	3.94	3.96	3.97	3.99	4.01	4.02	4.04	4.06	4.08
24.	4.09	4.11	4.13	4.14	4.16	4.18	4.20	4.21	4.23	4.25
25.	4.26	4.28	4.30	4.31	4.33	4.35	4.37	4.38	4.40	4.42
26.	4.43	4.45	4.47	4.49	4.50	4.52	4.54	4.55	4.57	4.59
27.	4.60	4.62	4.64	4.66	4.67	4.69	4.71	4.72	4.74	4.76
28.	4.78	4.79	4.81	4.83	4.84	4.86	4.88	4.89	4.91	4.93
29.	4.95	4.96	4.98	5.00	5.01	5.03	5.05	5.07	5.08	5.10
30.	5.12	5.13	5.15	5.17	5.18	5.20	5.22	5.24	5.25	5.27
31.	5.29	5.30	5.32	5.34	5.36	5.37	5.39	5.41	5.42	5.44
32.	5.46	5.47	5.49	5.51	5.53	5.54	5.56	5.58	5.59	5.61
33.	5.63	5.65	5.66	5.68	5.70	5.71	5.73	5.75	5.76	5.78
34.	5.80	5.82	5.83	5.85	5.87	5.88	5.90	5.92	5.93	5.95
35.	5.97	5.99	6.00	6.02	6.04	6.05	6.07	6.09	6.11	6.12
36.	6.14	6.16	6.17	6.19	6.21	6.22	6.24	6.26	6.27	6.29
37.	6.31	6.33	6.34	6.36	6.38	6.40	6.41	6.43	6.45	6.46
38.	6.48	6.50	6.51	6.53	6.55	6.57	6.58	6.60	6.62	6.63
39.	6.65	6.67	6.69	6.70	6.72	6.74	6.75	6.77	6.79	6.80
40.	6.82	6.84	6.86	6.87	6.89	6.91	6.92	6.94	6.96	6.98
41.	6.99	7.01	7.03	7.04	7.06	7.08	7.09	7.11	7.13	7.15
42.	7.16	7.18	7.20	7.21	7.23	7.25	7.27	7.28	7.30	7.32
43.	7.33	7.35	7.37	7.38	7.40	7.42	7.44	7.45	7.47	7.49
44.	7.50	7.52	7.54	7.55	7.57	7.59	7.61	7.62	7.64	7.66
45.	7.67	7.69	7.71	7.73	7.74	7.76	7.78	7.79	7.81	7.83
46.	7.84	7.86	7.88	7.90	7.91	7.93	7.95	7.96	7.98	8.00
47.	8.01	8.03	8.05	8.07	8.08	8.10	8.12	8.13	8.15	8.17
48.	8.19	8.20	8.22	8.24	8.25	8.27	8.29	8.31	8.32	8.34
49.	8.36	8.37	8.39	8.41	8.42	8.44	8.46	8.48	8.49	8.51

TABLE VI.—SHOWING PER CENT OF P_2O_5 CORRESPONDING TO WEIGHT OF $Mg_2P_2O_7$. CALCULATED FOR .5 Gram SUBSTANCE.

Gm.	0	1	2	3	4	5	6	7	8	9
.000	.00	.01	.03	.04	.05	.06	.08	.09	.10	.11
.001	.13	.14	.15	.17	.18	.19	.20	.22	.23	.24
.002	.26	.27	.28	.29	.31	.32	.33	.34	.36	.37
.003	.38	.40	.41	.42	.43	.45	.46	.47	.48	.50
.004	.51	.52	.54	.55	.56	.57	.59	.60	.61	.63
.005	.64	.65	.66	.68	.69	.70	.71	.73	.74	.75
.006	.76	.78	.79	.80	.82	.83	.84	.85	.87	.88
.007	.89	.91	.92	.93	.94	.96	.97	.98	1.00	1.01
.008	1.02	1.03	1.05	1.06	1.07	1.08	1.10	1.11	1.12	1.14
.009	1.15	1.16	1.17	1.19	1.20	1.21	1.22	1.24	1.25	1.26
.010	1.28	1.29	1.30	1.31	1.33	1.34	1.35	1.37	1.38	1.39
.011	1.40	1.42	1.43	1.44	1.45	1.47	1.48	1.49	1.51	1.52
.012	1.53	1.54	1.56	1.57	1.58	1.59	1.61	1.62	1.63	1.65
.013	1.66	1.67	1.68	1.70	1.71	1.72	1.74	1.75	1.76	1.77
.014	1.79	1.80	1.81	1.82	1.84	1.85	1.86	1.88	1.89	1.90
.015	1.91	1.93	1.94	1.95	1.96	1.98	1.99	2.00	2.02	2.03
.016	2.04	2.05	2.07	2.08	2.09	2.11	2.12	2.13	2.14	2.16
.017	2.17	2.18	2.19	2.21	2.22	2.23	2.25	2.26	2.27	2.28
.018	2.30	2.31	2.32	2.33	2.35	2.36	2.37	2.39	2.40	2.41
.019	2.42	2.44	2.45	2.46	2.48	2.49	2.50	2.51	2.53	2.54
.020	2.55	2.56	2.58	2.59	2.60	2.62	2.63	2.64	2.65	2.67
.021	2.68	2.69	2.70	2.72	2.73	2.74	2.76	2.77	2.78	2.79
.022	2.81	2.82	2.83	2.85	2.86	2.87	2.88	2.90	2.91	2.92
.023	2.93	2.95	2.96	2.97	2.99	3.00	3.01	3.02	3.04	3.05
.024	3.06	3.07	3.09	3.10	3.11	3.13	3.14	3.15	3.16	3.18
.025	3.19	3.20	3.22	3.23	3.24	3.25	3.27	3.28	3.29	3.30
.026	3.32	3.33	3.34	3.36	3.37	3.38	3.39	3.41	3.42	3.43
.027	3.44	3.46	3.47	3.48	3.50	3.51	3.52	3.53	3.55	3.56
.028	3.57	3.59	3.60	3.61	3.62	3.64	3.65	3.66	3.67	3.69
.029	3.70	3.72	3.73	3.74	3.75	3.76	3.78	3.79	3.80	3.82
.030	3.83	3.84	3.85	3.87	3.88	3.89	3.90	3.92	3.93	3.94
.031	3.96	3.97	3.98	3.99	4.01	4.02	4.03	4.04	4.06	4.07
.032	4.08	4.10	4.11	4.12	4.13	4.15	4.16	4.17	4.18	4.20
.033	4.21	4.22	4.24	4.25	4.26	4.27	4.29	4.30	4.31	4.33
.034	4.34	4.35	4.36	4.38	4.39	4.40	4.41	4.43	4.44	4.45
.035	4.47	4.48	4.49	4.50	4.52	4.53	4.54	4.55	4.57	4.58
.036	4.59	4.61	4.62	4.63	4.64	4.66	4.67	4.68	4.70	4.71
.037	4.72	4.73	4.75	4.76	4.77	4.78	4.80	4.81	4.82	4.84
.038	4.85	4.86	4.87	4.89	4.90	4.91	4.92	4.94	4.95	4.96
.039	4.98	4.99	5.00	5.01	5.03	5.04	5.05	5.07	5.08	5.09
.040	5.10	5.12	5.13	5.14	5.15	5.17	5.18	5.19	5.21	5.22
.041	5.23	5.24	5.26	5.27	5.28	5.29	5.31	5.32	5.33	5.35
.042	5.36	5.37	5.38	5.40	5.41	5.42	5.44	5.45	5.46	5.47
.043	5.49	5.50	5.51	5.52	5.54	5.55	5.56	5.58	5.59	5.60
.044	5.61	5.63	5.64	5.65	5.66	5.68	5.69	5.70	5.72	5.73
.045	5.74	5.75	5.77	5.78	5.79	5.80	5.82	5.83	5.84	5.86
.046	5.87	5.88	5.89	5.91	5.92	5.93	5.95	5.96	5.97	5.98
.047	6.00	6.01	6.02	6.03	6.05	6.06	6.07	6.09	6.10	6.11
.048	6.12	6.14	6.15	6.16	6.17	6.19	6.20	6.21	6.23	6.24
.049	6.25	6.26	6.28	6.29	6.30	6.32	6.33	6.34	6.35	6.37

TABLE VI.—CONTINUED. PER CENT OF P_2O_5 CORRESPONDING TO WEIGHT OF $Mg_2P_2O_7$. CALCULATED FOR .5 Gram SUBSTANCE.

Gm.	0	1	2	3	4	5	6	7	8	9
.050	6.38	6.39	6.40	6.42	6.43	6.44	6.46	6.47	6.48	6.49
.051	6.51	6.52	6.53	6.55	6.56	6.57	6.58	6.60	6.61	6.62
.052	6.63	6.65	6.66	6.67	6.69	6.70	6.71	6.72	6.74	6.75
.053	6.76	6.77	6.79	6.80	6.81	6.83	6.84	6.85	6.86	6.88
.054	6.89	6.90	6.91	6.93	6.94	6.95	6.97	6.98	6.99	7.00
.055	7.02	7.03	7.04	7.06	7.07	7.08	7.09	7.11	7.12	7.13
.056	7.15	7.16	7.17	7.18	7.20	7.21	7.22	7.23	7.25	7.26
.057	7.27	7.29	7.30	7.31	7.32	7.34	7.35	7.36	7.37	7.39
.058	7.40	7.41	7.43	7.44	7.45	7.46	7.48	7.49	7.50	7.51
.059	7.53	7.54	7.55	7.57	7.58	7.59	7.60	7.62	7.63	7.64
.060	7.66	7.67	7.68	7.69	7.71	7.72	7.73	7.74	7.76	7.77
.061	7.78	7.80	7.81	7.82	7.83	7.84	7.85	7.87	7.88	7.90
.062	7.91	7.92	7.94	7.95	7.96	7.97	7.99	8.00	8.01	8.03
.063	8.04	8.05	8.06	8.08	8.09	8.10	8.11	8.13	8.14	8.15
.064	8.17	8.18	8.19	8.20	8.22	8.23	8.24	8.25	8.27	8.28
.065	8.29	8.31	8.32	8.33	8.34	8.36	8.37	8.38	8.39	8.41
.066	8.42	8.43	8.45	8.46	8.47	8.48	8.50	8.51	8.52	8.54
.067	8.55	8.56	8.57	8.59	8.60	8.61	8.62	8.64	8.65	8.66
.068	8.68	8.69	8.70	8.71	8.73	8.74	8.75	8.76	8.78	8.79
.069	8.80	8.82	8.83	8.84	8.85	8.87	8.88	8.89	8.90	8.92
.070	8.93	8.94	8.96	8.97	8.98	8.99	9.01	9.02	9.03	9.05
.071	9.06	9.07	9.08	9.10	9.11	9.12	9.13	9.15	9.16	9.17
.072	9.19	9.20	9.21	9.22	9.24	9.25	9.26	9.27	9.29	9.30
.073	9.31	9.33	9.34	9.35	9.36	9.38	9.39	9.40	9.42	9.43
.074	9.44	9.45	9.47	9.48	9.49	9.50	9.52	9.53	9.54	9.56
.075	9.57	9.58	9.59	9.61	9.62	9.63	9.65	9.66	9.67	9.68
.076	9.70	9.71	9.72	9.73	9.75	9.76	9.77	9.78	9.80	9.81
.077	9.82	9.84	9.85	9.86	9.87	9.89	9.90	9.91	9.93	9.94
.078	9.95	9.96	9.98	9.99	10.00	10.02	10.03	10.04	10.05	10.07
.079	10.08	10.09	10.11	10.12	10.13	10.14	10.16	10.17	10.18	10.19
.080	10.21	10.22	10.23	10.25	10.26	10.27	10.28	10.30	10.31	10.32
.081	10.33	10.35	10.36	10.37	10.38	10.40	10.41	10.42	10.44	10.45
.082	10.46	10.47	10.49	10.50	10.51	10.53	10.54	10.55	10.56	10.58
.083	10.59	10.60	10.62	10.63	10.64	10.65	10.67	10.68	10.69	10.71
.084	10.72	10.73	10.74	10.76	10.77	10.78	10.79	10.81	10.82	10.83
.085	10.85	10.86	10.87	10.88	10.90	10.91	10.92	10.93	10.95	10.96
.086	10.97	10.99	11.00	11.01	11.02	11.04	11.05	11.06	11.08	11.09
.087	11.10	11.11	11.13	11.14	11.15	11.16	11.18	11.19	11.20	11.22
.088	11.23	11.24	11.25	11.27	11.28	11.29	11.31	11.32	11.33	11.34
.089	11.36	11.37	11.38	11.39	11.41	11.42	11.43	11.45	11.46	11.47
.090	11.48	11.50	11.51	11.52	11.54	11.55	11.56	11.57	11.59	11.60
.091	11.61	11.62	11.64	11.65	11.66	11.68	11.69	11.70	11.71	11.73
.092	11.74	11.75	11.76	11.78	11.79	11.80	11.82	11.83	11.84	11.85
.093	11.87	11.88	11.89	11.91	11.92	11.93	11.94	11.96	11.97	11.98
.094	11.99	12.01	12.02	12.03	12.05	12.06	12.07	12.08	12.10	12.11
.095	12.12	12.14	12.15	12.16	12.17	12.19	12.20	12.21	12.22	12.24
.096	12.25	12.26	12.28	12.29	12.30	12.31	12.33	12.34	12.35	12.36
.097	12.38	12.39	12.40	12.42	12.43	12.44	12.45	12.47	12.48	12.49
.098	12.50	12.52	12.53	13.54	12.56	12.57	12.58	12.59	12.61	12.62
.099	12.63	12.65	12.66	12.67	12.68	12.70	12.71	12.72	12.74	12.75

TABLE VI.—CONTINUED. PER CENT OF P_2O_5 CORRESPONDING TO WEIGHT OF $Mg_2P_2O_7$. CALCULATED FOR .5 Gram SUBSTANCE.

Gm.	0	1	2	3	4	5	6	7	8	9
.100	12.76	12.77	12.79	12.80	12.81	12.82	12.84	12.85	12.86	12.88
.101	12.89	12.90	12.91	12.93	12.94	12.95	12.96	12.98	12.99	13.00
.102	13.02	13.03	13.04	13.05	13.07	13.08	13.09	13.10	13.12	13.13
.103	13.14	13.16	13.17	13.18	13.19	13.21	13.22	13.23	13.25	13.26
.104	13.27	13.28	13.30	13.31	13.32	13.33	13.35	13.36	13.37	13.39
.105	13.40	13.41	13.42	13.44	13.45	13.46	13.47	13.49	13.50	13.51
.106	13.53	13.54	13.55	13.56	13.58	13.59	13.60	13.62	13.63	13.64
.107	13.65	13.67	13.68	13.69	13.70	13.72	13.73	13.74	13.76	13.77
.108	13.78	13.79	13.81	13.82	13.83	13.85	13.86	13.87	13.88	13.90
.109	13.91	13.92	13.93	13.95	13.96	13.97	13.99	14.00	14.01	14.02
.110	14.04	14.05	14.06	14.07	14.09	14.10	14.11	14.13	14.14	14.15
.111	14.16	14.18	14.19	14.20	14.22	14.23	14.24	14.25	14.27	14.28
.112	14.29	14.30	14.32	14.33	14.34	14.36	14.37	14.38	14.39	14.41
.113	14.42	14.43	14.45	14.46	14.47	14.48	14.50	14.51	14.52	14.53
.114	14.55	14.56	14.57	14.59	14.60	14.61	14.62	14.64	14.65	14.66
.115	14.67	14.69	14.70	14.71	14.73	14.74	14.75	14.76	14.78	14.79
.116	14.80	14.81	14.83	14.84	14.85	14.87	14.88	14.89	14.90	14.92
.117	14.93	14.94	14.95	14.97	14.98	14.99	15.01	15.02	15.03	15.04
.118	15.06	15.07	15.08	15.10	15.11	15.12	15.13	15.15	15.16	15.17
.119	15.18	15.20	15.21	15.22	15.24	15.25	15.26	15.27	15.29	15.30
.120	15.31	15.32	15.34	15.35	15.36	15.38	15.39	15.40	15.41	15.43
.121	15.44	15.45	15.47	15.48	15.49	15.50	15.52	15.53	15.54	15.55
.122	15.57	15.58	15.59	15.61	15.62	15.63	15.64	15.66	15.67	15.68
.123	15.70	15.71	15.72	15.73	15.75	15.76	15.77	15.78	15.80	15.81
.124	15.82	15.83	15.85	15.86	15.87	15.89	15.90	15.91	15.92	15.94
.125	15.95	15.96	15.98	15.99	16.00	16.01	16.03	16.04	16.05	16.06
.126	16.08	16.09	16.10	16.12	16.13	16.14	16.15	16.17	16.18	16.19
.127	16.21	16.22	16.23	16.24	16.26	16.27	16.28	16.29	16.31	16.32
.128	16.33	16.35	16.36	16.37	16.38	16.40	16.41	16.42	16.44	16.45
.129	16.46	16.47	16.49	16.50	16.51	16.52	16.54	16.55	16.56	16.58
.130	16.59	16.60	16.61	16.63	16.64	16.65	16.66	16.68	16.69	16.70
.131	16.72	16.73	16.74	16.75	16.77	16.78	16.79	16.80	16.82	16.83
.132	16.84	16.86	16.87	16.88	16.89	16.91	16.92	16.93	16.94	16.96
.133	16.97	16.98	17.00	17.01	17.02	17.03	17.05	17.06	17.07	17.09
.134	17.10	17.11	17.12	17.14	17.15	17.16	17.17	17.19	17.20	17.21
.135	17.23	17.24	17.25	17.26	17.28	17.29	17.30	17.32	17.33	17.34
.136	17.35	17.37	17.38	17.39	17.40	17.42	17.43	17.44	17.46	17.47
.137	17.48	17.49	17.51	17.52	17.53	17.55	17.56	17.57	17.58	17.60
.138	17.61	17.62	17.63	17.65	17.66	17.67	17.69	17.70	17.71	17.72
.139	17.74	17.75	17.76	17.77	17.79	17.80	17.81	17.83	17.84	17.85
.140	17.86	17.88	17.89	17.90	17.92	17.93	17.94	17.95	17.97	17.98
.141	17.99	18.00	18.02	18.03	18.04	18.06	18.07	18.08	18.09	18.11
.142	18.12	18.13	18.15	18.16	18.17	18.18	18.20	18.21	18.22	18.23
.143	18.25	18.26	18.27	18.29	18.30	18.31	18.32	18.34	18.35	18.36
.144	18.37	18.39	18.40	18.41	18.43	18.44	18.45	18.46	18.48	18.49
.145	18.50	18.52	18.53	18.54	18.55	18.57	18.58	18.59	18.60	18.62
.146	18.63	18.64	18.66	18.67	18.68	18.69	18.71	18.72	18.73	18.74
.147	18.76	18.77	18.78	18.80	18.81	18.82	18.83	18.85	18.86	18.87
.148	18.88	18.90	18.91	18.92	18.94	18.95	18.96	18.97	18.99	19.00
.149	19.01	19.02	19.04	19.05	19.06	19.08	19.09	19.10	19.11	19.13

TABLE VI.—CONTINUED. PER CENT OF P_2O_5 CORRESPONDING TO WEIGHT OF $Mg_2P_2O_7$. CALCULATED FOR .5 Gram SUBSTANCE.

Gm.	0	1	2	3	4	5	6	7	8	9
.150	19.14	19.15	19.16	19.18	19.19	19.20	19.22	19.23	19.24	19.25
.151	19.27	19.28	19.29	19.30	19.32	19.33	19.34	19.36	19.37	19.38
.152	19.39	19.41	19.42	19.43	19.45	19.46	19.47	19.48	19.50	19.51
.153	19.52	19.53	19.55	19.56	19.57	19.59	19.60	19.61	19.62	19.64
.154	19.65	19.66	19.67	19.69	19.70	19.71	19.73	19.74	19.75	19.76
.155	**19.78**	**19.79**	**19.80**	**19.81**	**19.83**	**19.84**	**19.85**	**19.87**	**19.88**	**19.89**
.156	19.90	19.92	19.93	19.94	19.95	19.97	19.98	19.99	20.01	20.02
.157	20.03	20.05	20.06	20.07	20.08	20.10	20.11	20.12	20.13	20.15
.158	20.16	20.17	20.19	20.20	20.21	20.22	20.24	20.25	20.26	20.27
.159	20.29	20.30	20.31	20.33	20.34	20.35	20.36	20.38	20.39	20.40
.160	**20.42**	**20.43**	**20.44**	**20.45**	**20.47**	**20.48**	**20.49**	**20.51**	**20.52**	**20.53**
.161	20.54	20.56	20.57	20.58	20.59	20.61	20.62	20.63	20.65	20.66
.162	20.67	20.68	20.70	20.71	20.72	20.74	20.75	20.76	20.77	20.79
.163	20.80	20.81	20.82	20.84	20.85	20.86	20.88	20.89	20.90	20.91
.164	20.93	20.94	20.95	20.96	20.98	20.99	21.00	21.02	21.03	21.04
.165	**21.05**	**21.07**	**21.08**	**21.09**	**21.10**	**21.12**	**21.13**	**21.14**	**21.16**	**21.17**
.166	21.18	21.19	21.21	21.22	21.23	21.25	21.26	21.27	21.28	21.30
.167	21.31	21.32	21.33	21.35	21.36	21.37	21.39	21.40	21.41	21.42
.168	21.44	21.45	21.46	21.48	21.49	21.50	21.51	21.53	21.54	21.55
.169	21.56	21.58	21.59	21.60	21.62	21.63	21.64	21.65	21.67	21.68
.170	**21.69**	**21.70**	**21.72**	**21.73**	**21.74**	**21.76**	**21.77**	**21.78**	**21.79**	**21.81**
.171	21.82	21.83	21.85	21.86	21.87	21.88	21.90	21.91	21.92	21.93
.172	21.95	21.96	21.97	21.99	22.00	22.01	22.02	22.04	22.05	22.06
.173	22.07	22.09	22.10	22.11	22.13	22.14	22.15	22.16	22.18	22.19
.174	22.20	22.22	22.23	22.24	22.25	22.27	22.28	22.29	22.30	22.32
.175	**22.33**	**22.34**	**22.36**	**22.37**	**22.38**	**22.39**	**22.41**	**22.42**	**22.43**	**22.44**
.176	22.46	22.47	22.48	22.50	22.51	22.52	22.53	22.55	22.56	22.57
.177	22.59	22.60	22.61	22.62	22.64	22.65	22.66	22.67	22.69	22.70
.178	22.71	22.73	22.74	22.75	22.76	22.78	22.79	22.80	22.81	22.83
.179	22.84	22.85	22.87	22.88	22.89	22.90	22.92	22.93	22.94	22.96
.180	**22.97**	**22.98**	**22.99**	**23.01**	**23.02**	**23.03**	**23.04**	**23.06**	**23.07**	**23.08**
.181	23.10	23.11	23.12	23.13	23.15	23.16	23.17	23.18	23.20	23.21
.182	23.22	23.24	23.25	23.26	23.27	23.29	23.30	23.31	23.33	23.34
.183	23.35	23.36	23.38	23.39	23.40	23.41	23.43	23.44	23.45	23.47
.184	23.48	23.49	23.50	23.52	23.53	23.54	23.55	23.57	23.58	23.59
.185	**23.61**	**23.62**	**23.63**	**23.64**	**23.66**	**23 67**	**23.68**	**23.70**	**23.71**	**23.72**
.186	23.73	23.75	23.76	23.77	23 78	23.80	23 81	23.82	23.84	23.85
.187	23.86	23.87	23.89	23.90	23.91	23.93	23.94	23.95	23.96	23.98
.188	23.99	24.00	24.01	24.03	24.04	24.05	24.07	24.08	24.09	24.10
.189	24.12	24.13	24.14	24.15	24.17	24.18	24.19	24.21	24.22	24.23
.190	**24.24**	**24.26**	**24.27**	**24.28**	**24.30**	**24.31**	**24.32**	**24.33**	**24.35**	**24.36**
.191	24.37	24.38	24.40	24.41	24.42	24.44	24.45	24.46	24.47	24.49
.192	24.50	24.51	24.52	24.54	24.55	24.56	24.58	24 59	24,60	24.61
.193	24.63	24.64	24.65	24.67	24.68	24.69	24.70	24.72	24.73	24.74
.194	24.75	24.77	24.78	24.79	24.81	24.82	24.83	24.84	24.86	24.87
.195	**24.88**	**24.89**	**24.91**	**24.92**	**24.93**	**24.95**	**24.96**	**24.97**	**24.98**	**25.00**
.196	25.01	25.02	25.04	25.05	25.06	25.07	25.09	25.10	25.11	25.12
.197	25.14	25.15	25.16	25.18	25.19	25.20	25.21	25.23	25.24	25.25
.198	25.26	25.28	25.29	25.30	25.31	25.33	25.34	25.35	25.37	25.38
.199	25.39	25.40	25.42	25.43	25.44	25.46	25.47	25.48	25.49	25.51

TABLE VII.—VALUE PER TON FROM PER CENTAGE; CALCULATED TO TENTHS OF ONE PER CENT; THE AMOUNT TO BE ADDED FOR THE HUNDREDTHS OF ONE PER CENT WILL BE FOUND IN LINE MARKED "D."

Cts. per Lb.	Per Ct.	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
		D	.01	.02	.04	.05	.06	.07	.08	.10	.11
	0.	.00	.12	.24	.36	.48	.60	.72	.84	.96	1.08
	1.	1.20	1.32	1.44	1.56	1.68	1.80	1.92	2.04	2.16	2.28
	2.	2.40	2.52	2.64	2.76	2.88	3.00	3.12	3.24	3.36	3.48
6	3.	3.60	3.72	3.84	3.96	4.08	4.20	4.32	4.44	4.56	4.68
	4.	4.80	4.92	5.04	5.16	5.28	5.40	5.52	5.64	5.76	5.88
	5.	6.00	6.12	6.24	6.36	6.48	6.60	6.72	6.84	6.96	7.08
	6.	7.20	7.32	7.44	7.56	7.68	7.80	7.92	8.04	8.16	8.28
	7.	8.40	8.52	8.64	8.76	8.88	9.00	9.12	9.24	9.36	9.48
	8.	9.60	9.73	9.84	9.96	10.08	10.20	10.32	10.44	10.56	10.68
	9.	10.80	10.92	11.04	11.16	11.28	11.40	11.52	11.64	11.76	11.88
	10.	12.00	12.12	12.24	12.36	12.48	12.60	12.72	12.84	12.96	13.08
	11.	13.20	13.32	13.44	13.56	13.68	13.80	13.92	14.04	14.16	14.28
	12.	14.40	14.52	14.64	14.76	14.88	15.00	15.12	15.24	15.36	15.48
	13.	15.60	15.72	15.84	15.96	16.08	16.20	16.32	16.44	16.56	16.68
	14.	16.80	16.92	17.04	17.16	17.28	17.40	17.52	17.64	17.76	17.88
	15.	18.00	18.12	18.24	18.36	18.48	18.60	18.72	18.84	18.96	19.08
	16.	19.20	19.32	19.44	19.56	19.68	19.80	19.92	20.04	20.16	20.28
	17.	20.40	20.52	20.64	20.76	20.88	21.00	21.12	21.24	21.36	21.48
	18.	21.60	21.72	21.84	21.96	22.08	22.20	22.32	22.44	22.56	22.68
	19.	22.80	22.92	23.04	23.16	23.28	23.40	23.52	23.64	23.76	23.88

		D	.01	.01	.02	.02	.03	.04	.04	.05	.05
	0.	.00	.06	.12	.18	.24	.30	.36	.42	.48	.54
3	1.	.60	.66	.72	.78	.84	.90	.96	1.02	1.08	1.14
	2.	1.20	1.26	1.32	1.38	1.44	1.50	1.56	1.62	1.68	1.74
	3.	1.80	1.86	1.92	1.98	2.04	2.10	2.16	2.22	2.28	2.34
	4.	2.40	2.46	2.52	2.58	2.64	2.70	2.76	2.82	2.88	2.94
	5.	3.00	3.06	3.12	3.18	3.24	3.30	3.36	3.42	3.48	3.54
	6.	3.60	3.66	3.72	3.78	3.84	3.90	3.96	4.02	4.08	4.14
	7.	4.20	4.26	4.32	4.38	4.44	4.50	4.56	4.62	4.68	4.74
	8.	4.80	4.86	4.92	4.98	5.04	5.10	5.16	5.22	5.28	5.34
	9.	5.40	5.46	5.52	5.58	5.64	5.70	5.76	5.82	5.88	5.94

		D	.00	.01	.01	.02	.02	.02	.03	.03	.04
	0.	.00	.04	.08	.12	.16	.20	.24	.28	.32	.36
2	1.	.40	.44	.48	.52	.56	.60	.64	.68	.72	.76
	2.	.80	.84	.88	.92	.96	1.00	1.04	1.08	1.12	1.16
	3.	1.20	1.24	1.28	1.32	1.36	1.40	1.44	1.48	1.52	1.56
	4.	1.60	1.64	1.68	1.72	1.76	1.80	1.84	1.88	1.92	1.96

MARYLAND

Agricultural Experiment Station.

BULLETIN No. 31.

POTATO EXPERIMENTS.

COLLEGE PARK, MD.

March, 1895.

MARYLAND

Agricultural Experiment Station.

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MARYLAND AGRICULTURAL EXPERIMENT STATION,
COLLEGE PARK, MARYLAND.

POTATO EXPERIMENTS.

By Robert H. Miller and E. H. Brinkley.

The following experiments were made with potatoes during the season of 1894:

No. 1. Test of Early Varieties.
No. 2. Crimson Clover as a Fallow for Late Potatoes.
No. 3. Spraying with Bordeaux Mixture for Blight.
No. 4. Early vs. Late Spraying.
No. 5. Wide vs. Narrow Rows.
No. 6. Shallow vs. Deep Cultivation.
No. 7. Ridge vs. Level Cultivation.
No. 8. Early vs. Late Cultivation.
No. 9. Comparative Profits in Planting Different Size Seed.

TEST OF EARLY VARIETIES.

For the purpose of ascertaining the comparative merits of different varieties of early potatoes, twenty kinds were selected—most of them from reliable seedsmen in several different states. These varieties had gained reputations of being prolific yielders in the localities where they were grown. The land selected for the experiment had been in corn the previous year, and as the soil was somewhat thin, a top dressing of street sweepings was applied to it. Seven hundred pounds of a complete fertilizer was sowed in the row. The different varieties were cut to as near a uniform size as possible, and were planted the 19th of March. A good stand was secured, and as the weather was favorable during the early part of the season, there was a promise of a fine yield; but the extremely dry season which came later on, and the early blight (which up to this season had not made its appearance in Maryland) killed the vines off very suddenly, and as a consequence only a moderate yield was secured.

In the following table will be found the yields and also the source from whence the seed was obtained. It will be noticed that Nos. 6 and 7 are the same variety of potato, but the seed was obtained from different sources—No. 6, from Jerrard of Maine, and No. 7, from Councilman of Maryland. As will be seen the northern grown seed has given a yield of thirty-nine bushels to the acre in excess of the Maryland grown seed.

TABLE I.

VARIETIES OF POTATOES TESTED—1894.

Yield in Bushels per Acre.

No.	NAME OF VARIETY.	SEED OBTAINED FROM	YIELD PER ACRE. BUSHELS.
1.	Columbus	Ford	169 0
2.	Lightning Express	Salzer	120 0
3.	Early Cyclone	"	143 0
4.	Summit	Jerrard	120 ½
5.	New Queen	"	145 0
6.	New Queen	Councilman	106 0
7.	Farmers' Alliance	Landreth	119 0
8.	Great Hundredfold	Salzer	138 0
9.	Extra Early	Home Grown	140 0
10.	Garfield	Landreth	149 0
11.	Early Norther	Jerrard	127 0
12.	Van-Arnums Superb	Home Grown	141 0
13.	Chas. Downing	Maul	167 0
14.	Rochester Rose	Jerrard	143 0
15.	Van-Guard	Home Grown	146 0
16.	Early Maine	Maul	144 0
17.	Puritan	Councilman	126 0
18.	Early Ohio	Maul	149 0
19.	New Early White Prize	"	116 0
20.	Beauty of Hebron	"	136 0

NOTE.—Some of the notes of this experiment were unfortunately lost, and we therefore only give the gross yields in the above table.

CRIMSON CLOVER AS A FALLOW FOR POTATOES.

The land on which this test was made had been in corn the previous year, and on half of it crimson clover seed was sown at the time of the last working of the corn; extremely dry weather resulted in rather a poor stand, but as it tillered well the following spring, a fairly good growth was made, which was plowed under the first of May. At this time the clover was most of it in bloom. The adjoining plot on which there was no clover, was also plowed at the same time. The clover fallow was worked down close so that it might decompose as rapidly as possible, and was allowed to stand until the 13th of June when the potatoes were planted, by which time the clover had become thoroughly rotted. Four hundred pounds of fertilizer was applied per acre to the land on which crimson clover was plowed down, and 600 lbs. to the acre on the adjoining plot, the subsequent treatment of each plot was the same in every respect. The cultivation consisted of three workings, twice with Iron Age cultivator and once with double shovel with bull tongues attached.

The following table gives the yields of the respective plots in merchantable and unmerchantable potatoes, and also the comparative profits of each, not taking into account the slight additional cost of plowing under the clover:

TABLE II.

YIELD AND COMPARATIVE PROFITS OF GREEN MANURING WITH CRIMSON CLOVER FOR POTATOES.

CRIMSON CLOVER AND FOUR HUNDRED POUNDS FERTILIZER.

Yield of merchantable, 56 bushels 13 pounds at 60 cents bushel	$ 33.74
" " unmerchantable, 16 bushels 1 pound, at 27 " "	4.32
Total value of crop	$38.06
Cost of clover seed and fertilizer	5.20
Relative profits	$ 32.86

SIX HUNDRED LBS. FERTILIZER.—NOTHING TURNED UNDER.

Yield of merchantable, 48 bushels 35 pounds at 60 cents per bushel	$ 29.16
Yield of unmerchantable 4 bushels, 10 pounds at 27 cents per bushel	1.25
Total value of crop	$30.41
Cost of fertilizer	6.30
Relative profits	24.11
The use of crimson clover increased the value of the crop	$ 8.75

As will be seen, the yield is light in this as in all the tests which follow where the White Elephant potato was used. This seed was obtained from Maine, and being delayed in transit was in bad condition when it reached us, and a poor stand was the result; in addition to this, we had extremely dry weather during most of the growing season—there being less than half the average rain-fall for ten weeks, or from the time of planting, June 15, until September 1.

SPRAYING WITH BORDEAUX MIXTURE FOR PREVENTION OF BLIGHT.

The land used in this test as in all of those to follow except the last one "comparative profits in planting different size seed," had a crop of crimson clover plowed down as described in previous test. The potatoes, (White Elephant) were planted the 13th of June. The cultivation was similar to that described in the last experiment. The Bordeaux solution in this test was made after the following formula: 5 lbs. of sulphate of copper, 5 lbs. of quick lime and 50 gallons of water.

It is prepared as follows: The copper sulphate is dissolved in two gallons of hot water in a wooden pail; this is then poured into a barrel about one-half full of water. The lime is slacked and made into the consistency of ordinary white-wash; then strained through a coarse gunny sack, so as to take out any lumps or matter which would be likely to

clog the nozzle of the spraying apparatus. This lime is then poured into a barrel containing the copper sulphate solution, and water added sufficient to make 50 gallons of the entire mixture. The solution should be thoroughly stirred so that the precipitate which has been formed, will be uniformily suspended throughout the whole solution.

Four sections of 5 rows each were used in this test; sections 1 and 3 were sprayed with bordeaux mixture on July 31, August 15, and August 27, sections 2 and 4 were not treated at all.

In the following table will be found the results of the experiment:

TABLE III.

SPRAYING VS. UNSPRAYING WITH BORDEAUX MIXTURE.

Yield in bushels and pounds per acre,

	SPRAYED.		UNSPRAYED.	
	Bush.	Lbs.	Bush.	Lbs.
Merchantable.....	85	49	61	49
Unmerchantable.....	14	41	14	29
Total.....	100	34	76	22

As will be seen there was a gain of 24 bushels and 12 pounds from this application. In the test for 1893, the average gain for two varieties (Burbank and Empire State) was 25 bushels and 13 pounds.

EARLY vs. LATE SPRAYING.

The following test was for the purpose of ascertaining how early it is profitable to commence applying the fungicide. The variety of potatoes used in this test was the White Elephant, which were planted on June 14, and the size, and number of plots, planting and cultivation, was similar in every respect to that described in the previous test.

Sections 1 and 3 in this experiment were sprayed on the following dates: July 16, July 28, August 14 and August 27; sections 2 and 4 were sprayed July 31, August 15 and August 27.

As will be seen section 1 and 3 were sprayed 15 days in advance of sections 2 and 4.

The following table gives the comparative yields:

TABLE IV.

EARLY VS. LATE SPRAYING.

Yield in bushels and pounds per acre.

	EARLY SPRAYED.		LATE SPRAYED.	
	Bush.	Lbs.	Bush.	Lbs.
Merchantable.....	94	25	78	6
Unmerchantable.....	28	12	19	55
Total.....	122	37	98	5

Table IV shows that the gain from the early spraying was twenty-four bushels and thirty-two pounds. Comparing the yield of the early sprayed section with the unsprayed plot in previous test, we have a gain of forty-six bushels and fifteen pounds. The average gain in two varieties (Empire State and Burbank) of early over late spraying for the year 1893, was six bushels and thirty-eight pounds.

SPRAYING APPARATUS.

The following is the apparatus and methods used the past season in applying fungicides and insecticides on potatoes in the experiments given:

A double Empire Spraying Pump was purchased of the Field Force Pump Co., of Lockport, N. Y. This pump is equipped with two sections of discharge hose and nozzles, and has an agitating pipe for stirring the liquid so that the precipitate is kept in complete suspension.

With this pump mounted in a horse cart, with a man to drive and work the pump, and one man on either side at the rear to direct the hose, very rapid work can be accomplished, as eight rows can be sprayed at one crossing of the field. The London purple, or Paris Green, being mixed with the fungicide, the one operation accomplished the two-fold result of killing the potato beetle and preventing the blight.

WIDE vs. NARROW ROWS.

In this test in section 1 and 3, the rows were 2½ feet wide and the potatoes dropped 14½ inches in the row; in sections 2 and 4, the rows were 3 feet wide and potatoes dropped twelve inches in the row, approximately the same quantity of seed per acre being used in each case. The variety of potatoes planted was the White Elephant, and the cultivation, etc., was similar to that described in previous tests.

The following table gives the comparative yields of wide and narrow rows:

TABLE V.

WIDE VS. NARROW ROWS.

Yield in bushels and pounds per acre.

	NARROW ROWS.		WIDE ROWS.	
	Bush.	Lbs.	Bush.	Lbs.
Merchantable	86	2	67	8
Unmerchantable	21	0	17	45
Total	107	2	84	53

As will be seen there was a gain of about 22 bushels to the acre. It is believed this gain is largely owing to the fact that with the narrow rows a more complete shading of the ground was produced than with the wide rows, which in a dry season is of great importance.

SHALLOW vs. DEEP CULTIVATION.

The White Elephant potato was used in this test, and the potatoes were planted the 15th of June; the plots being similar to those described in previous tests. Sections 1 and 3 were cultivated to a depth not to exceed 2½ inches, while sections 2 and 4 were worked to a depth of from 6 to 7 inches. Each plot received the same number of workings.

The following table gives the results of the deep and shallow working.

TABLE VI.

SHALLOW VS. DEEP WORKING.

Yield in bushels and pounds per acre.

	SHALLOW WORKING.		DEEP WORKING.	
	Bush.	Lbs.	Bush.	Lbs.
Merchantable	67	37	71	54
Unmerchantable	20	49	18	6
Total	88	30	90	4

RIDGE vs. LEVEL CULTURE.

Burbank potatoes were used in this test, and were planted the 18th of June. The cultivation was similar to that previously described, except that at the last working, the rows of sections 1 and 3 were ridged by running down the middle a single shovel plow with broad shovel attached while sections 2 and 4 were worked the last time with cultivator with narrow plates, going once in the row.

In the following table will be found the results of the test:

TABLE VII.

RIDGE VS. LEVEL CULTURE.

Yield in bushels and pounds per acre.

	LEVEL CULTURE.		RIDGE CULTURE.	
	Bush.	Lbs.	Bush.	Lbs.
Merchantable	69	36	77	49
Unmerchantable	21	39	17	49
Total	91	19	95	42

As will be seen, there was a very slight gain in favor of ridge culture. In the test for 1893, the yield was less than 2 bushels per acre in favor of ridge culture.

EARLY VS. LATE CULTIVATION.

In this test the planting and variety of potatoes used, was similar to the one just described. In the cultivation, sections 1 and 3 were given an additional working which sections 2 and 4 did not receive. This working was given ten days after the others had been laid by.

In the following table will be found the respective yields.

TABLE VIII.

EARLY VS. LATE CULTIVATION.

Yields in bushels and pounds per acre.

	EARLY CULTIVATION.		LATE CULTIVATION.	
	Bush.	Lbs.	Bush.	Lbs.
Merchantable.....	96	31	96	26
Unmerchantable.....	18	0	19	55
Total.....	114	31	116	25

It will be seen that there was a very slight gain in favor of late cultivation.

COMPARATIVE PROFITS FROM PLANTING DIFFERENT SIZE SEED.

Before giving the details of this test, we desire to say that the results obtained are only applicable with conditions similar to those under which the experiment was tried, that is to say, extremely hot dry weather at time of planting with the ground almost entirely dried out. These conditions not unfrequently prevail at time of planting the late crop of potatoes. The lesson taught by the figures is a very plain one, that is, under such conditions it is well to plant whole seed size potatoes, as where the potato is cut, and in proportion to the amount of cut surface exposed, it has its moisture sapped from it, and as a result many of the cuttings fail to come up. This is the explanation of the very striking difference in yields as reported in this test.

The test consisted in planting:

1. Large whole potatoes.
2. Large whole potatoes cut to the size of an egg.
3. Large whole potatoes cut to one eye.
4. Seed size planted whole.
5. Seed size cut to four pieces.

In the following table will be found the relative financial results from planting the different size seed, no account being taken of cost of fertilizer, etc.

TABLE IX.

LARGE WHOLE POTATOES.

Yield of merchantable, 122 bush. 51 lbs., at 65 cents per bu		$79.88
" " unmerchantable, 79 bush. 50 lbs., at 27 cents per bu....		21.57
Total receipts.....		$101.45
Cost of seed planted, 88 bus. 8 lbs., at $1.25 per bushel.....		110.09
Relative loss.....		$ 9.64

LARGE POTATOES CUT TO EGG SIZE.

Yield of merchantable, 108 bush. 17 lbs., at 65 cents per bu.....		$ 70.40
" " unmerchantable, 20 bush. 22 lbs., at 27 cents per bu....		5.52
Total receipts.....		$ 75.92
Cost of seed planted, 24 bush. at $1.25 per bushel.....	$30.00	
Expense for cutting Seed, 24 bush. at 10 cts. per bu....	2.40	32.40
Relative profits.....		$ 43.52

LARGE POTATOES CUT TO ONE EYE.

Yield of merchantable, 37 bush. 2 lbs., per acre at 65 cts. per bu.		$ 24.06
" " unmerchantable, 6 bush. 27 lbs., pr. acre at 27 cts. pr. bu.		1.74
Total receipts.....		$ 25.80
Cost of seed planted, 12 bush. at $1.25 per bushel.....	$15.00	
Expense of cutting seed, 12 bush. at 10 cts. per bu.....	1.20	16.20
Relative profits..		$ 9.60

SMALL POTATOES PLANTED WHOLE.

Yield of merchantable, 141 bush. 53 lbs., pr. acre at 65 cts. pr. bu.		$ 92.33
" " unmerchantable,33 bush. 18 lbs., pr. acre at 27 cts. pr. bu.		9.00
Total receipts.....		$101.33
Cost of seed planted, 17 bush per acre at 60 cents per bushel....		10.20
Relative profits..		$ 91.13

SMALL POTATOES CUT TO FOUR PIECES.

Yield of merchantable, 61 bush. 7 lbs. at 65 cents per bushel.....		$ 39.73
" " unmerchantable, 11 bush. 6 lbs. at 27 cts. per bushel...		5.73
Total receipts.....		$ 45.46
Cost of seed planted, 7 bush. 42 lbs. at 60 cts. per bu.....$4.65		
Expense for cutting seed, 7 bush. 42 lbs., at 10 cts. per bu. .77		5.42
Relative profits.....		$ 40.04

As will be seen the yields from the large whole potatoes and small whole ones were about the same, but owing to the cost of the large whole seed, there was an actual loss of $9.64 per acre, while with the small whole ones there was a profit of $91.13, not including the cost of fertilizers and other expenses which were common to each lot.

AGRICULTURAL DEPARTMENT.

EXPERIMENTS WITH POTATOES, SEASON OF 1894.

By Robert H. Miller and E. H. Brinkley.

SUMMARY OF RESULTS.

1.—In the test of early varieties, the leading yields were Columbus, 169 bushels; Charles Downing, 167 bushels; Early Ohio, 149 bushels; Garfield, 149 bushels; New Queen, 145 bushels; and Early Cyclone, 143 bushels per acre.

2.—Crimson Clover plowed down for potatoes increased the value of the crop $8.75 per acre.

3.—Spraying with Bordeaux Mixture, increased the yield twenty-four bushels to the acre.

4.—Early spraying increased the yield twenty-four bushels to the acre over late spraying.

5.—In the test of wide and narrow rows, the narrow rows gave an increase yield of twenty-two bushels to the acre.

6.—Shallow and deep working gave practically the same results.

7.—Ridge culture gave slightly better yields than level culture.

8.—Early and late cultivation gave about the same yields.

9.—In the test, "planting different size seed" (in ground which was exceptionally dry). The net profits were very largely in favor of the plot planted with whole small potatoes.

MARYLAND

Agricultural Experiment Station.

BULLETIN No. 32.

THE SAN JOSE SCALE.

COLLEGE PARK, MD.

April, 1895.

MARYLAND

Agricultural Experiment Station.

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Located on the B. & O. R. R., 8 miles N. of Washington, D. C.

NOTICE.

The bulletins of the Station will be mailed free to any citizen of Maryland who sends his name and address to the station for that purpose.

Correspondents will please notify the Director of changes in their post office address, or of any failure to receive the bulletins.

ADDRESS,
MARYLAND AGRICULTURAL EXPERIMENT STATION,
COLLEGE PARK, MARYLAND.

LETTER OF SUBMITTAL.

MARYLAND AGRICULTURAL EXPERIMENT STATION,

DEPARTMENT OF PHYSIOLOGY AND ECONOMIC ENTOMOLOGY,

COLLEGE PARK, MD.

MARCH 10, 1895.

SIR:—

I take pleasure in submitting herewith a bulletin on the San Jose Scale, the most important, perhaps, of the insects which now affect the fruit interests of the State. Another bulletin on some of the insects which have lately attracted attention is in course of preparation.

Respectfully yours,

C. V. RILEY.

To Robert H. Miller, Esq.,

Director, Maryland Agricultural Experiment Station.

INTRODUCTION.

No insect is just now of more importance to the fruit-growers of Maryland than that which has been designated as the San Jose Scale, a name, given to it because it first became known, or was first particularly noticed around San Jose, California. It is exceptionally injurious, usually causing the death of the affected trees: occurs on a great variety of deciduous trees and has great power of multiplication. It was only in the Autumn of 1893 that the presence of this insect, which is one of the worst with which California fruit-growers have had to deal, was suspected on the Atlantic Coast. It was then thought to be restricted in its range, and I had hopes that it might be effectually stamped out. But during the past year it has been found at, or reported from, so many new localities in the East, all the way from Florida to New York, including the States of Maryland and Virginia, that there is no hope of being able to exterminate it. It has come to stay, but as it is possible to very materially limit its injury and spread, and by proper precautions to prevent its introduction into districts in which it does not yet occur, I feel warranted in giving a pretty full account of the species in the present bulletin.

As will be seen from the context of this bulletin, it is already reported from points in Charles, Kent, Talbot, Anne Arundel, Prince George's, Washington and Frederick counties, Maryland, and it is my earnest hope that all into whose hands this bulletin may fall and who recognize the scale upon any of their trees will at once send to the Station specimens with as full account as possible of the extent of the infection. Other species, not in the same way to be dreaded, will frequently be confounded with it, and the entomologist will be glad to examine specimens that may be suspected and make proper report and, where necessary, visit the localities. It is only by making a thorough survey of the State for infected centers that we may hope to succeed in limiting or still further restricting the range of the species, and in this work the fruit-growers themselves may materially assist by correspondence with the Station and should do so for their own good.

The illustrations were prepared for the Department of Agriculture and are used by the courtesy of Secretary Morton.

C. V. R.

THE SAN JOSE SCALE.

(*Aspidiotus perniciosus* Comstock.)

A Serious and Recent Importation into Maryland.

By Dr. C. V. Riley.

PAST HISTORY OF THE SPECIES.

The following history of the species up to the year 1892, may be reproduced from my Annual Report as Entomologist of the Department of Agriculture for 1893.

In the Annual Report of this Department for 1880, Prof. J. H. Comstock described under the above name, an insect which he had collected in Santa Clara County, Cal. He stated that from what he had seen of the species, he considered it to be the most pernicious scale-insect known in this country. He had never seen any other species so abundant as this was in certain orchards, and was told that it infested all the deciduous fruits grown in California, except the peach, the apricot and the black Tartarian cherry. As a remedy he suggested the use of strong alkaline washes.

Until very recently the San Jose Scale has been confined to the Pacific Coast, but has extended north to Washington, and south to the Mexican border, and has become, perhaps, the chief enemy to Pacific coast horticulture. Considerable attention has naturally been paid to the species by California horticulturists.

FIG. 1.—San Jose Scale: *a*, pear, moderately infested—natural size: *b*, female scale—enlarged. —(from *Insect Life*.)

In 1883, Matthew Cooke published figures of the larva, male pupa, and adult male, together with the adult female scales on twig and fruit. He stated that the insect was first noticed by fruit shippers as infesting fruit in 1873, at San Jose, Santa Clara County. From that time it spread rapidly until 1880, and but little effort was made to exterminate it. In the winter of 1881-82, crude petroleum was applied extensively; in some cases with good results, but in the majority of instances with great harm to the

trees, many trees dying from the effects. The remedies recommended were one pound of concentrated lye to a gallon of water, and six pounds of caustic soda to twelve ounces of potash, and eight gallons of water. These remedies were to be applied only at the dormant seasons. While the tree is in leaf: one pound of whale-oil soap, one-third of a pound of sulphur, and an ounce and a half of lye or caustic soda to a gallon of water was recommended.

In 1894 the late Dr. S. F. Chapin, in his biennial report as State Inspector of fruit pests, mentioned the San Jose scale, but stated that in Santa Clara County, where it first appeared, there had been a most gratifying decrease in its numbers, and in the destructive effects following its presence, both results having been brought about by the intelligent and well directed efforts of the fruit-growers. He stated that the scale had been found at that time in many different localities in the State, but had not caused any great decrease in orchard products. He urged that the pest should be watched and treated in its incipiency.

In the biennial report of the State Board of Horticulture of California for 1885-'86, the late W. G. Klee, then State Inspector of fruit pests, published a short account of the insect, illustrating its characteristic appearance upon twig, leaf and fruit. Mr. Klee stated that the insect has three distinct broods—one in June, one in August, and one in October; but that these broods overlap, and in consequence the summer washes are not thorough remedies unless frequently repeated. He therefore recommended winter treatment, consisting of the cutting back and thorough thinning of all trees above twenty feet in height, together with thorough scrubbing of the rough bark of the old trees, and the application of one-half pound of concentrated lye, one-half pound of commercial potash, and five quarts of water.

In the Proceedings of the Eighth Fruit-Growers' Convention, published in the report of the State Board of Horticulture for 1887-'88, Prof. C. H. Dwinelle, is said to have reported the most perfect success in fighting the San Jose scale in Sonoma County, Cal. A seriously infested orchard was treated with absolutely complete success by means of a wash composed of one-half pound of commercial potash, one-half pound of caustic soda, and five quarts of water. This was applied when the trees were in a dormant condition.

In the report of the same Board for 1889, a reprint is given of Comstock's description in an article upon scale-insects and remedies. Several formulæ for summer and winter washes are given, the most successful of which, and the one which has come into most general use, being the so-called lime-sulphur-salt wash. This wash consists of forty pounds of unslaked lime, twenty pounds of sulphur, fifteen pounds of rock salt, and water to make sixty gallons. The summer washes comprise potash and caustic soda, and whale-oil soap and sulphur, with a slight admixture of caustic soda and potash. In the report of the Board for 1891, Mr. Alexander Craw published an article entitled "insect pests and their extermination," in which he briefly discusses this species. He considers it to be a very serious pest of deciduous trees, but states that the

remedies just mentioned are so cheap and effective, that no excuse can be tolerated for a seriously infested orchard. He further states that a Chalcid fly(*Aphelinus fuscipennis* Howard) had been found doing such effective work in subduing the species in an orchard in the neighborhood of Los Angeles, that a complete restoration of the orchard was confidently expected.

In Bulletin 26, of this Division, Mr. Coquillett, in his report of the scale-insects of California, devotes four pages to this species. He states that its origin is uncertain, but that the fact of its being so frequently found upon plants imported from Japan would seem to point to that country as its original home. He states that the species never attacks citrus or coniferous trees, and that the LeConte pear, when growing in the midst of other varieties of pear, is almost exempt. The twice-stabbed ladybird (*Chilocorus bivulnerus*) is mentioned as being the most abundant and efficacious enemy of the scale, although Mr. Coquillett has never known an instance where even one single tree has been entirely or very nearly freed from the scales by the work of this beetle. The article concludes with a series of experiments with washes. The result of these experiments was that the resin and caustic soda wash recommended by Mr. Coquillett, in Bulletin 23, of the Division, was found to be superior to the others. This wash is to be applied only during the dormant season, and consists of thirty pounds of resin, nine pounds of seventy per cent. caustic soda, four and a-half pints of fish oil, and water to make one hundred gallons.

Mr. Coquillett's testimony as to the good offices of *Chilocorus bivulnerus*, coincides with that of other observers, but a surprising instance, which indicates that the species may occasionally prove effective, was mentioned in *The California Fruit Grower*, in 1892. It was there stated that Mr. N. W. Motheral, procured a number of these beetles in San Diego county, (date not given) and placed them in some orchards in Tulare county, which were badly infested with the scale. They did not appear to multiply greatly until the spring of 1892, when immense numbers appeared simultaneously and completely cleared the orchards of the county of the scale.

An interesting ladybird of the genus Scymnus was found in 1892, by Dr. Blaisdell, preying upon the San Jose scale at the Coronado parks, near San Diego. This species was described by Dr. Blaisdell, as *Scymnus lophanthae n. sp.*, but is one of the species imported by Mr. Koebele, from Australia, and has not proved very effective in destroying the Aspidiotus.

In the September, 1892, number of the *Agricultural Gazette*, of New South Wales, Mr. A. Sidney Olliff, reported the receipt of a typical series of *Aspidiotus perniciosus* on the fruit, leaves, and twigs of pear from West Maitland, New South Wales. Mr. Olliff further stated that although this species had not previously been recorded as occurring in Australia, it had been known to some fruit-growers for a number of years.

In an important paper read by Mr. Alexander Craw, before the State Horticultural Society, of California, December, 1892, the San Jose scale is stated to be unquestionably of foreign origin, and it is further sur-

mised, on the authority of Mr. John Britton, of San Jose, that it was introduced into California upon trees received from Chile by the late James Lick.

In Bulletin 7 of the New Mexico College of Agriculture, published in June, 1892, Mr. C. H. Tyler Townsend, entomologist of the station, records the occurrence of the species at Las Cruces upon apple, pear, plum, peach, quince and rose, and states that it was brought into New Mexico on young trees from California. The winter eggs are mentioned in Mr. Townsend's account as turning orange-yellow in spring and hatching the first or second week in May.

ITS HISTORY IN THE ATLANTIC STATES.

Early in August, 1893, specimens of this species were first brought to my attention, while yet government entomologist, by Prof. B. T. Galloway, Chief of the Division of Vegetable Pathology, U. S. Department of Agriculture, who received it on a pear sent by Dr. C. H. Hedges, of Charlottesville, Va., who had mistaken it for a fungus disease. Recognizing the importance of the matter, I drew attention to this introduction at the meeting of the Association of Economic Entomologists, at Madison, Wis., the latter part of the same month. On the supposition that it might be restricted to Dr. Hedges' trees, I took active steps to furnish all possible information about the subject, and endeavored to interest the State Board of Agriculture of Virginia. I had the infested region at Charlottesville, carefully investigated by Mr. E. A. Schwarz and Mr. D. W. Coquillett, whose reports were published in *Insect Life*, Vol. 6, pp. 247 and 253. The insect was found upon pear, peach, plum, apple, quince, rose, currant, gooseberry and raspberry. The careful survey of the field thus made seemed to justify the belief that this was a local and restricted outbreak. At a meeting of the State Board of Agriculture at Newport, Va., I read a paper upon the subject, urging active measures for its extermination, and pledging, on Secretary Morton's account, the active co-operation of the National Department in such measures.

Believing that the most effective way to exterminate it was by the use of what is known as the gas treatment, i. e., the fumigation of the trees under a tent by means of hydrocyanic acid gas, this being known as a most effective insecticide and most likely to reach and kill all the insects, my first efforts were in this direction. It was the first time that efforts had been made to employ the gas treatment in the Eastern States, though this treatment has been used for many years and is very popular in the orange groves of California. Mr. Coquillett, who had been the agent of

the Division at Los Angeles and who had discovered and developed this gas treatment, was fortunately with me in Washington at the time, so that the treatment was entrusted to him. We had some difficulty, in the first place, in getting the tents manufactured, and still further difficulty in putting them in operation. There are various contrivances in California used for the operation of these tents, the simplest of which, perhaps, for average sized or small trees, are poles with which the two ends of a quadrangular tent are thrown over the tree, the tree itself supporting the sheet. In the Charlottesville case the tents were constructed of eight ounce duck and made in the form of an octagonal sheet, and were oiled with boiled linseed oil, two of them measuring twenty-eight and the other two forty-four feet in diameter. The fumigation was subsequently reported to have been successful in destroying the insect without injuring the trees, though some of these had already begun to leaf out or were in blossom. Later developments, however, showed that a few of the insects had escaped death just as I had found to be the case in the gas treatment at Montserrat.

During the period when the experiments were being made, or during March and April, 1894, fate had decreed that I should be absent in the West Indies. After making all due arrangements to have the work of extermination thoroughly prosecuted, and after having finished my Annual Report to the Department in which an illustrated article upon this San Jose Scale was included, I suddenly decided to make a trip to the West Indies, more particularly to study two scale-insects, viz., the Purple Scale (*Mytilaspis citricola*) and the Orange Scale (*Chionaspis citri*) which under the denomination of "blights," had been for some years killing out not only acres, but square miles of limes on the Island of Montserrat. This trip was taken at the earnest solicitation of the Montserrat Company, of Birmingham, England, without any cost to the Department of Agriculture and without any remuneration to myself. The importance of the

FIG. 2. San Jose Scale: Apple Branch, with scales in situ-natural size.—from *Insect Life*,

matter and the indirect bearing of the results on the management of these two scales, which also affect citrus trees in Florida, justified my request for leave of absence for this purpose. Very thorough fumigation was being carried on there by an expert, Mr. R. T. Mullard, from Los Angeles, as the washes usually effective with us, seemed less so there. The condition of things was most interesting and exceptional, and I felt that a study of it might prove valuable, not only to the Montserrat people, but to our own.

It was during this absence from the Department that specimens of the San Jose Scale were brought by Mr. E. Dows to Mr. L. O. Howard, my Assistant-in-charge, from Riverside, Charles county, Maryland. He at once had the matter investigated. Some twenty acres are planted to an orchard which contains some 2000 peach trees, having some 250 apple trees mixed with them. The introduction could be traced to the planting in the Spring of 1888, from stock obtained from the old established and well-known nurseries of John R. Parry, at Parry, N. J. Many of the older trees were found to be dead, and most of the others badly affected. Adjacent orchards within a radius of two miles, the stock of which had been obtained from other nurseries, were found to be quite free from the scale.

Later in March further specimens were received at the Department from De Funiak Springs, Fla. Here the insect, as subsequent evidence showed, was found not only upon peach and pear, but also upon pecan and persimmon. Mr. Howard, as Acting Entomologist, now deemed the matter of sufficient importance to issue a circular of warning. This gave a summary of the information at hand with certain figures that I had ordered prepared for an intended article in *Insect Life*. The circular was widely distributed both directly to Eastern fruit growers and through the newspapers, and, as a result, a number of new localities of infection were discovered, and among them Neavitt, Talbot county, Md. The infested orchard is located on one of the inlets of the Chesapeake Bay and contains about fourteen acres of peach trees, and all of the trees having been badly affected. So far as investigation could determine, both by Mr. Coquillett and Mr. Howard, the first trees planted in this orchard were received from the well-known nursery of my old friends, the Stark Brothers, of Louisiana, Mo.

Later, Mr. Marlatt discovered another infested locality in Maryland, on the place of Capt. R. S. Emory, at Chestertown, in Kent county, and the original trees were here also traced to the New Jersey nursery aforementioned.

The following correspondence is of interest in connection with the history of the species in the Atlantic States, and may be published now, since there can no longer be any object in keeping secret the name of the nurserymen who have been unwittingly instrumental in disseminating the pest. The Parrys have been most public-spirited in their efforts to stamp out the species, so far as their own nurseries are concerned, at a great sacrifice to themselves; and from a verbal report made to me by Mr. William Parry during the late meeting of the American Pomological Society in California, I am satisfied that there will be less danger in future from receiving stock from these nurseries than perhaps from others which have not been so thoroughly disinfected.

APRIL 20th, 1894.

MR. WM. PARRY,
PARRY, N. J.

Dear Sir:—

I have just received from a gentleman in Lewisburg, Pa., pear twigs affected by the San Jose scale and he informs me that the insect was introduced upon pear trees which he purchased from you. I send you enclosed a copy of an emergency circular just issued from this Division, and hope it will induce you to examine your nursery stock and make every effort to destroy the insect. Above all things, I would strongly urge you not to send out any nursery stock this spring unless you are absolutely sure that it is clean. Can you give me the facts (not for publication, if you have any objection), as to how this scale could have reached your nursery? Yours truly,

C. V. RILEY,
Entomologist.

PARRY, N. J., April 25th, 1894.

PROF. C. V. RILEY,
DEPT. OF AGR., DIVISION OF ENTOMOLOGY, WASHINGTON, D. C.

Dear Sir:—

We are in receipt of your esteemed favor of April 20th, and are surprised and alarmed to learn we have the San Jose Scale—although from samples sent Professor Smith, of New Jersey State Experiment Station, he expressed fears such was the case and we have made an appointment with him to visit our grounds—and as you recommend we will not send anything of which we have any doubts.

We have no positive evidence how this scale reached us. We have been in the habit of getting from California fruit and nut trees, principally from Japan varieties and generally imported. From your bulletin

I infer it does not attack nut trees nor Japan persimmons. By referring to our books, I find that in the spring of 1887, we ordered of John Rock, San Jose, Cala., a quantity of Kelley's Japan plums. These were shipped us by order of John Rock from Stark Bros., Louisiana, Mo. They were received in unsalable condition so that they were not sold by us but trenched out in nursery rows to recover. They never did recover, but stood in the nursery two or three years and were dug up and burned, and my recollection is they were infested with an insect and think it very probable that it was introduced in our nursery in that way. We would prefer that our name would not be published in connection with this pest, as we realize it would ruin our business. We also realize the danger of distributing any stock infested with it, and have since receipt of your letter destroyed over $1,000 of young nursery stock, fearing, possibly, it might have been exposed to the same insect. And, hereafter, will make arrangements to have grown for us such stock as is liable to the attack until we get rid of it—and grow only that free from it. * *

Thanking you kindly for calling our attention to it and esteeming any information or assistance you can render us in connection therewith.

I am very respectfully,

JOHN R. PARRY.

MR. JOHN R. PARRY, APRIL 27th, 1894.
POMONA NURSERIES, PARRY, N. J.

Dear Sir:—

I have your long and satisfactory letter of the 25th inst. If you succeed in more positively ascertaining how the scale reached you, I shall esteem it a favor if you will notify me. In consideration of your intelligent appreciation of the situation and your promise to avoid further shipments of infested stock as well as to make every effort to destroy the insect in your nursery, it will be best, and most in accord with my own desires, for the department to say nothing in print regarding the means by which this insect has become distributed from your nursery for the present at least. No particular good could be accomplished by it, in view of your promise, though ultimately the historic fact will have to be recorded. I shall be glad if you will keep me posted as to the result of your operations against the insect.

Yours very truly,

C. V. RILEY,
Entomologist.

PROF. C. V. RILEY, PARRY, N. J., May 1st, 1894.
DIVISION OF ENTOMOLOGY, WASHINGTON, D. C.

Dear Sir:—

Yours received. We think the San Jose scale was introduced into our grounds by stock (Kelley's plum) shipped by Stark Bros., Louisiana,

Mo., upon order John Rock, San Jose, Cala., as stated in previous communication.

We have destroyed nearly all our orchard trees, as well as nursery trees, of Japan plums which appear to be favorites of the scale. We have also dug out many large trees of Bartlett, Idaho and other pears.

Professor Smith, of New Jersey Station, visited our grounds yesterday and probably has reported to you. Should there be any new developments, or anything of interest transpire in connection with our efforts to exterminate the scale, will advise you.

Respectfully,

JOHN R. PARRY.

The insect formed the subject of two important papers at the Sixth Annual Meeting of the Association of Economic Entomologists in Brooklyn the following August. One of these was by Mr. Howard, giving a full account of the work done by the Department of Agriculture and its results, and the other by Prof. J. B. Smith, of the Agricultural Experiment Station, of New Jersey. As a result of the discussion at that meeting, the occurrence of the insect was subsequently established in parts of Columbia county, N. Y., lying on the East bank of the Hudson river, below Albany, and in several localities on Long Island.

Still later in the season, as shown by some further notes of the subject by Mr. Howard, which he has prepared for No. 4, *Insect Life*, not yet out, but of which he has favored me with proofs, other localities for the insect were discovered, viz., Southern part of Georgia; Clermont county, Ohio; Newcastle county, Delaware; City Point, Prince George's county, Virginia, and at Bristol, Pennsylvania; while three other localities were added to Maryland, one in Prince George's county, one in Anne Arundel county, and one in Washington county.

There can be no question but that future investigation will show that the insect is quite widely disseminated in many other localities yet undiscovered, not only in orchards and nurseries, but also in isolated grounds, and that this general statement will apply to Maryland as well as to the other States in which it has obtained a foothold; and, while the energetic efforts that have already been made to stamp it out will go far toward doing so, we must accept the situation, and acknowledge that the species has come to stay. While, therefore, I consider that its entire extermination from so many points of infection over so large an area is impracticable and not to be hoped for, yet there is no reason why its spread to other localities may not be very materially, if not entirely checked. This, however, can only be done by intelligent action, not only on the part of

individuals, but by systematic and concerted action of communities in the State, made obligatory, if need be, by proper legislation. As preliminary, a pretty thorough entomological exploration of the State would be advisable, and, in the meantime, the information conveyed in this bulletin, if widely disseminated, with that which has already gone out from the National Department of Agriculture, may help to produce the desired results.

LIFE HISTORY OF THE SPECIES.

In order not to repeat too much in detail the phases of development common to this and other species of Scale-insects which belong to the same sub-family, viz: the Diaspinæ, or Armored-scales, it may be well, in this connection, to state a few characteristics which belong to almost all of them. This sub-family includes many of our worst scale-insects, like the Red Scale of the Orange in California (*Aspidiotus aurantii*) the Scurvy Scale of the apple (*Chionaspis furfurus*), the Oyster-Shell Bark Louse of the apple (*Mytilaspis pomorum*) and many others. The young or newly hatched individuals are almost microscopic creatures of white or pale yellow color, with body of ovoid form, flattened, with six legs, two short feelers having a varying number of joints, but rarely more than eight, and with two filamentous hairs at the end of the body. They are active but a brief period, sometimes but a few hours or even minutes, rarely more than a day or two and settle upon the bark near where they are born if there is a chance and it is not already too thickly covered with the parent scales. A long thread-like proboscis is gradually thrust under the epidermis and the insect becomes fixed and a flocculent waxy secretion begins to cover it. This increases until the larva underneath molts. The first larval skin becomes part of the secretion or shield and is known as the larval scale and the insect under it after this first molt loses its legs and feelers. The covering still further increases,

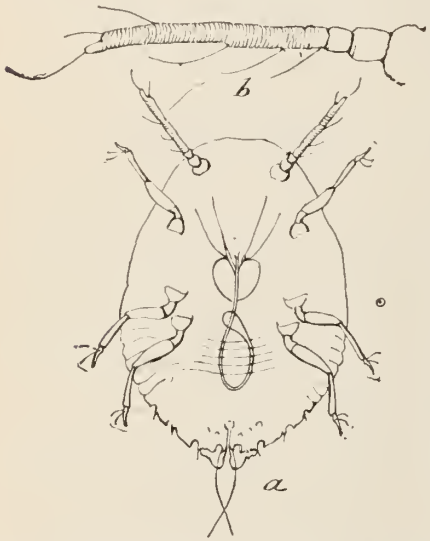

FIG. 3.—San Jose Scale: *a*, young larva—greatly enlarged: *b*, antenna of same—still more enlarged.—(from *Insect Life*.)

and a second molt takes place, and we have a covering which is known as the medial scale, and which either surrounds or extends from one end of the larval scale, according to the species. In the male the form of this scale is usually very much narrower than in the female, and often ribbed; it is, also, often markedly of a different color, or pure white, while the female scale is usually darker, or imitates the color of the bark. Thus the sexes are now distinguishable by their scales or shields while the insects, themselves, are also readily distinguished at this stage, the male having transformed to a pupa, with the limbs, feelers and wings foreshadowed, and the female remaining a mere yellow mass without such organs.

In the male a third molt takes place under this medial scale, and a delicate two-winged fly with long feelers and a single anal style backs out from the rear end. His color is usually pale, with a reddish or dusky band across the middle of the thorax, and the wings have but two delicate veins. The antennæ are variously jointed, the more common number of joints being eight. In the female scale, on the contrary, there is no particular difference of form after the second molt. She still grows and is destined to remain underneath her scale, which becomes much larger and forms what is known as the anal sack. Here after a third molt, she becomes fertile and either produces her young alive or lays her eggs. In either case the young in due time issue from the scale, and begin again the cycle of life, as already related. In those species in which the scale is more or less circular, like the one we are considering, the stages of the scale growth are not so readily separated as in the elongate species which resemble an oyster or a mussel shell. The larval scale is however, usually conspicuous, as a central raised point.

The different species of the sub-family are distinguished from each other not only by the peculiarities of their scales, which do not always offer trustworthy separating characters, but by the peculiar arrangement of the secretory pores on a darker and more chitinized anal plate, and by the peculiarities of the margin of this plate, especially in the female.

Our particular San Jose Scale is quite circular in form, very flat and pressed close to the bark. It grows from 1-16 to 1-8 of an inch in diameter in the female and about half this size in the male. It has the general color of the bark and the larval scale in the centre is a slightly raised point varying from yellowish to nearly black in color. It is perhaps, the smallest scale which occurs in Maryland, and is further characterized and distinguished from all others, which the fruit grower

has to deal with, by producing around the edge a reddish stain or discoloration, which penetrates for some depth in the formative tissues of the bark, and is particularly noticeable when the scales are sparse and not too crowded, or when upon fruit of an ordinary pale color. Another peculiarity is, the relatively large size and bright yellow color of the newly hatched young. At a short distance, when a branch or a tree is badly affected and the scales overlap each other, the tree looks as though it had been covered with lime or ashes, and when crushed or pressed or scraped the mature insects beneath the scales, if alive or fresh, produce a yellowish and rather greasy liquid. The accompanying figures, with the explanations underneath, show very well their appearance upon the pear, (Fig. 1); their general appearance on an apple branch, (Fig. 2); a ventral view of the young scale with a larger view of one of its antennæ

Fig. 4.—San Jose Scale: male adult greatly enlarged.—(from *Insect Life.*)

(Fig. 3); a dorsal view of the male (Fig. 4); and a ventral view of the female (Fig. 5); with her young developing, and with a large outline of a portion of the anal plate—the three last figures being very largely magnified and the natural size approximately indicated within an accompanying circle. The ordinary fruit grower would hardly be able to separate it from several other common insects which have existed in Maryland from time immemorial, were it not for the smaller size and the reddening effect which it produces upon the bark.

The observations made in California, as well as those made in the East and especially at the Department of Agriculture and recorded

in Mr. Howard's paper already referred to, would indicate that there are no very exact limitations between the various generations or broods of this insect, and that there may be some five annual generations in the latitude of Washington, each generation occupying on the average some forty days. The females hibernate in various stages of development but mostly as mature and impregnated females, since the male does not hibernate. The species is viviparous, i. e., the young are born alive. This has been made quite clear by the observations in the East and especially at Washington, though some writers have stated that eggs are produced. It is quite probable that both statements may be based on facts, and that there may be variation in this respect according to season, locality or conditions. One thing however, is clearly determined, viz. that the species may be viviparous throughout the year.

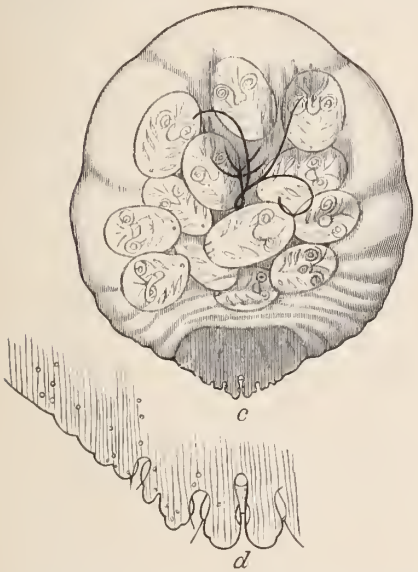

FIG. 5—San Jose Scale: *c*, adult female containing young—greatly enlarged: *d*, annal fringe of same—still more enlarged.—(from *Insect Life*.)

The large number of generations is exceptional though there is some compensation in that the individual is less prolific than in those species which produce fewer or but one annual generation. The individuals which have hibernated acquire full development and begin to produce young by the end of May or the first of June and from this time on there is a succession of generations. As in almost all other species of scale-insects the male scales, produced most in Summer, are, for the most part, formed on the leaves and show a tendency to gather along the midrib on the upper side.

The matter of most practical importance in the life history of the species is that *it continues multiplication from the beginning of June until late in the Autumn, or until Winter weather has fairly set in, and that during this time there is practically no period when the insect will not occur in almost every condition.*

ORIGINAL HOME OF THE SPECIES.

From previous writings upon the subject, more particularly in California, it has been assumed that this particular insect was derived from South America and particularly from Chili, but later evidence obtained by Mr. Howard and brought together in his last communication upon the subject, (*Insect Life*, volume 7, page 290, 291) indicate that it is probably a native of the Pacific Coast, and that it may have spread thence to those countries in which it is known to occur, viz., Chili and parts of Australia and the Island of Kauai (where it has been found by Mr. Albert Koebele,) just as it has been introduced thence into the Eastern States.

PARASITES AND NATURAL ENEMIES.

A widespread and minute parasite which attacks a number of other scale-insects of the same sub-family was reared from specimens originally collected at Riverside, Md., and has since been found elsewhere, as it was also previously known to occur in California. It sometimes does very effective work. It is a very minute Chalcid-fly (*Aphelinus fuscipennis* How.) which the average fruit-grower would not be able to distinguish from very many others of the same genus, and of which the accompanying figure of an allied species, very much enlarged, will convey a sufficiently accurate idea. The mature fly, having undergone its transformations beneath the scale, issues from a minute circular hole, and, whenever such minute and regular holes are discovered upon the scales, the presence of this, or some allied species of parasite, may be safely inferred. Another species (*Anaphes gracilis* How.) which also preys upon allied scale-insects, and especially on the common Oyster-shell Bark-louse of

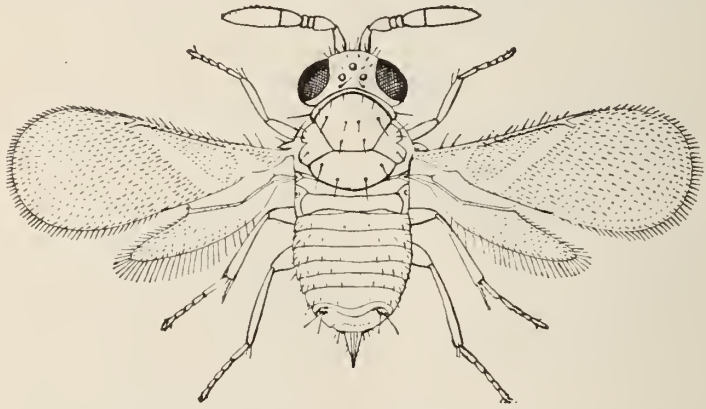

FIG. 6.—*Aphelinus diaspidis* How: greatly enlarged (from *Insect Life*.)

the apple, has also been reared at the Department from the scales taken at Riverside.

Among predaceous insects which feed upon it, the following are recorded in my report, as U. S. Entomologist, as observed at Charlottesville, Va. The common little Malachiid Beetle (*Collops quadrimaculatus*) was observed feeding in small numbers upon the newly hatched larvæ. The Coccinellid beetle (*Pentilia misela*) and its larvæ were very abundant on the infested trees, and this species, Mr. Schwarz thinks, it a very important enemy of the scale. The beetles seem to prefer the full-grown female scales, while the larvæ feed upon Aspidiotus larvæ. The larvæ customarily transform to the pupa state within the calyx of the pears. This little cavity was always found literally filled with a mass of young and old scales, full-grown Pentilia larvæ and pupæ, and recent imagoes. The fact that this beetle, which is essentially an Eastern species, so readily and effectively began to feed upon this introduced scale is a very interesting one, entomologically, and would justify an effort to introduce and colonize it in California.

A few of the lady-birds introduced from Australia, have also been found to prey upon it in California, and especially a steel-blue species, *Orcus australasiæ*, and it would be well to bring specimens to the East.

MODE OF SPREADING.

It follows, from what has already been stated of this and other allied species of scale-insects, that of their own accord they can spread but a very short distance annually. Indeed it is a question whether the insect could ever spread from tree to tree wherever the trees are some distance apart and the branches do not interlock, were it not for other agencies which aid them. The principal methods by which these insects are carried from one tree to another and from one place to another, while yet in the newly hatched larval condition are, (1) by the agency of wind, (2) that of running water, (3) by being carried upon the feet or feathers and hair of birds or other animals, and (4) particularly by means of flying and crawling insects and gossamer spiders which frequent the same trees. In this connection I quote the following from my last report as United States Entomologist:

"Some interesting observations were made by Mr. Schwarz, upon the transporting of the young Coccid larvæ by other insects. This very Pentilia was, unconsciously, an active agent in this dangerous work. Hardly one of the beetles could be found which did not carry on its back at least one Aspidiotus larva, and sometimes three or four were found upon a single wing-cover of a beetle. A small black ant (*Monomorium minu-*

tum) was adundant upon the pears, attracted by the juice emerging from the cracks, and almost every one of these ants carried on its back one or more specimens of the Coccid larvæ. Specimens of a little Chrysomelid beetle (*Typophorus canellus*) were also found upon the trees. Red and black specimens of these beetles occurred, and the interesting observation was made that while the Aspidiotus larvæ crawled freely upon the black individuals, no specimens were to be found upon the red ones. This same peculiar fact was also found to hold with the ants, since the red ant (*Formica schaufussi*) was abundant upon the pears, but no specimens were found bearing Aspidiotus larvæ, while, as just stated, the little black Monomorium was always found carrying specimens. Curiously enough, no ladybirds other than Pentilia were seen. The common Twice-stabbed ladybird (*Chilocorus bivulnerus*), which is so active an enemy of scale-insects and plant-lice throughout the Southern States, was absent."

The scale-insects are, however, primarily carried to long distances, while shielded by the scales, through the instrumentality of man, upon scions and nursery stock. The agency of wind has frequently been noted in the more rapid spread of the insects in the direction of prevailing winds. This agency is not only direct, wherever the wind is sufficiently strong, as in severe storms passing over infested districts at the right season, but it is also indirect in that the flight of insects bearing the young scale-insects is also influenced thereby. The young scale-insect is not easily dislodged from the twig or branch of a tree, but there is every reason for believing that when the tree is very badly infested so that the scales are literally piled one upon another, the young lice, finding no means of support thereon, more readily attach themselves to the bodies of other creatures or deliberately let themselves drop, to be carried by wind or by running water, this last means being much more effective in aiding their spread in countries which are dependent on artificial water-supply and where irrigating ditches run near or through the orchards.

As already indicated, it has been proved to have been introduced from California on nursery stock at Parryville, N. J., and there are probably other centres of infection, like that in Missouri, from which the insect has been brought directly from California. It would be unjust, however, to charge the nurserymen with the sole responsibility of this distribution, because there is every reason to believe that it has been introduced into other localities upon fruit, the rejected rind or peel of which, carrying the insect, has been thrown out of car windows or from

houses. This conclusion is justified by the frequency with which the insect has been found in our large Eastern markets, upon fruit, especially pears.

PREVENTIVE MEASURES.

It is obvious, from what has preceded, that most of the influences at work in helping the insects to spread are essentially local, and would hardly cause it to overrun the State for very many years to come. Yet, through man's instrumentality, there is constant danger of importation from infested regions long distances away, either upon fruit or nursery stock. It is, as a consequence, very desirable and necessary that every fruit grower in the State, whose trees are now free from the attacks of this pest, should be on his guard against such introduction. *No fruit should be brought on from an open market without first being inspected, and no buds, scions or trees from any nursery should be received without a similar, first careful inspection.*

REMEDIES.

When the emergency circular, already referred to, was issued by Mr. Howard from the Department of Agriculture, remedial suggestions necessarily had to be based on past experiments with this species confined to California, and with other species in other parts of the country. This experience was given in the following form:

Insecticides.—Where trees are found to have become badly infested the safest and, in the long run, the most economical course will be to cut them down and burn them, trunk and branch. Where the infestation is less marked, insecticide washes and sprays may be used. The young lice, before they have begun to secrete scales (and at this time they can only be discovered with the help of a magnifying glass), may be destroyed by spraying with kerosene-soap emulsion. A formula for this mixture follows:

Kerosene	gallons	2	= 67 per cent.
Common soap or whale-oil soap	pound	½	= 33 per cent.
Water	gallons	1	

Heat the solution of soap and add it boiling hot to the kerosene; churn the mixture by means of a force pump and spray nozzle for five or ten minutes The emulsion, if perfect, forms a cream which thickens upon cooling, and should adhere without oiliness to the surface of glass. If the water from the soil is hard, or has a large percentage of lime, add a little lye or bicarbonate of soda, or else use rain water. For use against scale-insects, dilute one part of the emulsion with nine parts of cold water.

For the older scales, the washes may be divided into those which can be used in summer without damage to the trees, and those which are so strong that they can only be applied during the winter season when the tree is dormant. None of the summer washes are perfectly efficacious, and

it is doubtful whether any of them will prove of more benefit than the kerosene emulsion just mentioned. Owing to the fact that we have had no summer experience with this insect in the East, we can not state positively the strengths of certain washes which may be used successfully without damage to the trees during the summer. In California, however, one of our agents, Mr. D. W. Coquillett, has used with success, during the summer, a resin wash which was made in the following proportions:

Resin	pounds	20
Caustic soda (70 per cent. strength)	do	5
Fish oil	pints	3
Water sufficient to make	gallons	100

It is probable that this mixture will not be too strong for eastern trees, since, in general, with other insecticides, the climate of California seems to render trees rather more susceptible to injury than is the case in the East. For a winter wash the same ingredients may be used in the following proportions:

Resin	pounds	30
Caustic soda (70 per cent. strength)	do	9
Fish oil	pints	4½
Water sufficient to make	gallons	100

The most favored winter remedy in California, however, is the lime, salt, and sulphur mixture. This is generally used throughout the State by progressive fruit growers. It consists of:

Unslaked lime	pounds	10
Sulphur	pounds	5
Stock salt	pounds	4
Water to make	gallons	15

This wash will do great damage to the trees if applied during the growing season, *and should be used only in winter*. All the sulphur and half the lime are placed in a kettle, and 8½ gallons water added, after which the contents of the kettle are boiled briskly for about an hour. The solution, which at first is yellow from the sulphur, will turn very dark brown, assuming more or less of a reddish tint, and will finally change from a thick batter to a thoroughly liquid condition, the product being ordinary sulphide of lime. All the sulphur is added to the remaining five pounds of lime and the latter slaked, after which the slaked lime and salt are added to the sulphide of lime already obtained, the whole being then diluted with water to make fifteen gallons. This should be strained before application, as it does not form a perfect liquid solution, on account of the considerable quantity of undissolved lime, which will soon settle to the bottom, unless the solution is constantly stirred while being sprayed.

In the experience of the Division in California and Washington, this solution has not been as successful as could be desired, but it has considerable popularity among the fruit-growers of California.

The Gas Treatment.—This method has not been extensively used in California against this insect, but has been used with very consider-

able success against the so-called Red Scale upon orange and lemon trees. It is an expensive operation, but is unquestionably more thorough than spraying. Trees infested with different kinds of Aspidiotus have been entirely freed by a single application of this gas.

The treatment consists in enveloping the tree in an air-tight tent and afterwards filling the tent with hydrocyanic acid gas, generated from fused potassium cyanide, sulphuric acid, and water. This gas is much lighter than air and as soon as generated rapidly rises and fills the tent. It is of course fatal to all forms of animal life, and care must be exercised in using this treatment. The tent is usually constructed in the form of an octagonal sheet, of what is ordinarily known as 8-ounce duck, and is afterwards oiled with boiled linseed oil. A tent of this kind, measuring 40 feet in diameter, will cost about $50, and other sizes in like proportion. Almost any glazed earthenware vessel will answer the purpose of a generator. The potassium cyanide used is usually of 60 per cent. strength and the sulphuric acid is of the ordinary commercial brand. The proportions are, 1 ounce by weight of cyanide 1 fluid ounce of the acid, and 3 fluid ounces of water. This is sufficient for 150 cubic feet of space inclosed by the tent.

The water is first placed in the generator, the acid added, and after the generator is placed under the tent the cyanide is added to the solution. The cost of the chemicals mentioned is small. The tree is subjected to the action of the gas for about half an hour. In treating trees 10 feet high or less, the tent can be placed over the tree by hand, but for those of greater height than this some sort of apparatus must be used for the purpose of elevating the tent over the tree. An apparatus in the form of a tripod, with a pulley at the top, serves this purpose very well.

The following table of the relative amount of ingredients to height and girth of tree top will be found useful:

Height of tree.	Diameter of tree top.	Water.	Sulphuric acid.	Potassium cyanide.
Feet.	*Feet.*	*Fluid ozs.*	*Fluid ozs.*	*Ounces.*
6	4	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{1}{3}$
8	6	2	1	1
10	8	$4\frac{1}{2}$	$2\frac{1}{4}$	$2\frac{1}{4}$
12	10	8	4	4
12	14	16	8	8
14	10	10	5	5
14	14	19	$9\frac{1}{2}$	$9\frac{1}{2}$
16	12	16	8	8
16	16	29	$14\frac{1}{2}$	$14\frac{1}{2}$
18	14	26	13	13
20	16	36	18	18
22	18	52	26	26
24	20	66	33	33

The best results will be obtained by treating the trees during the colder portion of the year or at night, as the gas is more liable to injure

the trees when used in very warm weather than it is when the weather is cooler.

The very poisonous character of the potassium cyanide itself and of the hydrocyanic acid gas must be strongly impressed upon those who undertake to use this treatment for the first time. The cyanide must be kept where children and animals can not get at it; it must be kept in tightly closed vessels, and must be plainly labelled "Poison." During the process of treatment every care must be taken to prevent human beings or domestic animals from inhaling the gas.

Judging from the experiments at Charlottesville, Va., under the auspices of Mr. Coquillett, and from those which were conducted so extensively in Montserrat on limes, even this gas treatment fails to destroy all the eggs where the insects are at all thickly crowded on the tree, so that a single fumigation can hardly be depended upon to be perfectly effective in extermination. I learn also from Mr. Howard that the pear trees seem to have materially suffered in the cracking of the bark, as a consequence of this gas treatment.

Summer and Winter Washes.—It so happens, also, that the different insecticides vary in their efficacy according to climatic and other conditions, and there is yet a wide field for careful experimentation bearing on these differences. In an address recently given before the American Pomological Society at its late session (Jan. 30, 1895,) in Los Angeles, Cal., I commented on these facts in the following language, which may be repeated in this connection:

"We must know the effect of a specific insecticide, or a certain mixture, upon the vitality of a given plant at a particular time of day, at a particular season, with a particular sun exposure, and under certain conditions of the plant, both as to vigor and exposure. We must know how different species of plants are affected under the same conditions. We have much to learn yet as to the possibilities of combining a fungicide and an insecticide. In some cases this combination may be made with great advantage, in other cases it is just as clear that no advantage has been derived. But what I wish particularly to call your attention to, is that all these different insecticides will act somewhat differently according to the varying conditions indicated, and that experience between the states east of the Rocky Mountains and the Pacific Coast is more particularly conflicting. The kerosene-emulsions, and especially the whale-oil kerosene-emulsions, have proved of the utmost value in the warfare against the scale-insects of the East; while some of the washes, especially your winter washes, which have, according to the best of evidence, given satisfaction to you, have proved, by contrast, of much less

value with us in the East. This has been particularly noticeable in a series of experiments which I conducted during the years 1893 and 1894, through Messrs. Marlatt, Coquillett and Pergande, and the results of which are embodied in a paper by the former, *Insect Life*, Vol. VII, pages 115-126). Some of the reasons for these varying experiences are not far to seek. As a State, California has many peculiarities, especially this, the southern portion of the State. It is essentially the land of scale-insects, and why? In the East the majority of our most injurious species produce but one generation annually, and the periods of hatching and developing, and the stages in which hibernation takes place are pretty definitely marked. Thus, for a period of about two weeks, generally in the month of May, all the young will hatch from eggs that were hibernated under the female scale. And by spraying the plants affected during this comparatively brief period, when the young and tender insects are so easily destroyed, the plants are, for the most part, easily protected.

"The species which hatch out very irregularly and produce more than one generation annually are the exception there. Here with you, on the contrary, all your most injurious species go on multiplying the year round, and there is scarcely any definite demarkation between the different broods, or the periods of hatching or the different stages of development. There is hardly any absolute period of rest, properly speaking, to be compared with the winter period of from four to nearly eight months in the East. Thus the winter washes, more particularly, vary in their effect in the two sections, as the scales in the East, being more thoroughly dormant, are not so easily killed."

It is evident, from the irregular and continuous production of the young of the San Jose scale during the summer months that the summer washes, useful if repeated with sufficient frequency, can hardly be depended upon to exterminate the insect or entirely rid the tree affected with it. The necessity of their frequent use makes them, also, more expensive. Any treatment that will be effective by one application is preferable, especially if this can be applied in the dead of the year when other horticultural operations do not command so much time. Hence our chief reliance must be on what are known as winter washes, or on the gas treatment already described.

The lime-salt-and-sulphur wash which is used with so much satisfaction against this insect in California proved much less satisfactory in a series of experiments which I had made during the winter 1893-1894 both on the Department grounds on other species of armored scales and on my own place at Sunbury. The experiments were made on American

and Japanese Euonymus affected by *Chionaspis euonymi* as also on a hedge of Japanese quince affected by the common Scurvy Scale *Chionaspis furfurus*. The resin washes were also found in experiments upon the same insects to be less effectual than they are in California.

The results since obtained at the Department of Agriculture give a very high relative value to the ordinary commercial whale-oil soap, applied at the rate of two pounds or more to the gallon of water, and next to this the resin wash used five or six times stronger than indicated in the ordinary formula. My own more recent experience this winter confirms the efficacy of the strong whale oil soap solution. Unfortunately both these washes are expensive, but in this as in so many other things the best, even if the most expensive, is the cheapest in the end, and where trees have already become infested by this pernicious insect they will be very likely to succumb in the end, unless some remedial measures are taken or unless some special efforts are made to introduce and encourage the parasites and natural enemies already treated of.

Mr. Howard, in his latest article, already referred to, summarizes in the following record a series of experiments in November and December, 1894, under rather disadvantageous circumstances, because of heavy rains intervening:

Whale-oil Soap.

1. Three pounds dissolved in one gallon of water. Fatal to all the scales on the trees sprayed with it.
2. Two pounds in one gallon of water. Same result.
3. One and one-half pounds in one gallon water. Fatal to ninety per cent. of the scales.
4. One pound in one gallon of water. Fatal to eighty per cent. of the scales.
5. One-half pound in one gallon of water. Fatal to one-half the scales.

Resin Wash:

6. Six times summer strength. Resin, 120 pounds; caustic soda, 30 pounds; fish-oil, 15 pints; water sufficient to make 100 gallons. Fatal to all the scales on the tree sprayed with it.
7. Four times summer strength. Resin, 80 pounds; caustic soda, 20 pounds; fish-oil, 10 pints; water sufficient to make 100 gallons. Fatal to eighty-five per cent. of the scales.

Kerosene Emulsion.

8. Pure. Fatal to ninety per cent. of the scales.
9. One part of emulsion and one of water. Fatal to eighty per cent. of scales.
10. One part of emulsion and two of water. Fatal to one-half the scales.
11. One part of emulsion and three of water. Fatal to thirty per cent. of scales.
12. One part of emulsion in four of water proved fatal to only a small percentage of scales. (On potted plants in Insectary.)
13. One part of the emulsion in six of water, fatal to a very small percentage of scales. (On potted plants in Insectary.)

Hard Laundry Soap:

14. Two pounds dissolved in one gallon of water. Fatal to eighty-five per cent. of the scales.
15. One and one-half pounds in one gallon of water. Same result.
16. One pound in one gallon of water. Fatal to sixty per cent. of the scales.
17. One-half pound in one gallon of water. Fatal to twenty per cent. of scales.
18. One-fourth pound in one gallon of water. Fatal to ten per cent. of scales.

Concentrated Potash Lye:

19. Two pounds in one gallon of water. Fatal to eighty-five per cent. of scales.
20. One pound in one gallon. Fatal to seventy-five per cent. of the scales.
21. One-half pound in one gallon. Fatal to one-half the scales.
22. One-fourth pound in one gallon. Fatal to twenty per cent. of the scales.

Fish-oil Soap, Home-made:

23. One and one-half pounds in one gallon of water. Fatal to half the scales.
24. One pound in one gallon. Fatal to twenty per cent.
25. One-half pound in one gallon of water. Fatal to five per cent. of the scales.

Oregon Winter Wash:

26. (Ordinary strength.) Sulphur, 15 pounds; slaked lime, 15 pounds; bluestone, 1¼ pounds; water sufficient to make 100 gallons. Fatal to a comparatively small percentage of the scales.

27. (Double strength.) Sulphur, 30 pounds; slaked lime, 30 pounds; bluestone, 2½ pounds; water sufficient to make 100 gallons. Quite a large percentage of the scales escaped destruction.

California Lime-sulphur-and-salt Wash:

28. (Ordinary strength.) Sulphur, 25 pounds; lime, 50 pounds; salt, 18 pounds; water sufficient to make 100 gallons. Fatal to a comparatively small percentage of the scales.

29. (Double strength.) Sulphur, 50 pounds; lime, 100 pounds; salt, 36 pounds; water to make 100 gallons. A rather large percentage of the scales not destroyed.

NOTE.—Experiments 8 to 11 and 14 to 25 were followed in from seven to ten hours after the application of the washes by a hard shower of ten or fifteen minutes' duration. Experiments 3 to 7 had been on the trees a little over twenty-four hours previous to this rainfall. The other experiments were of earlier date, and were not influenced by rains for a considerable time after the applications were made.

Insecticide Apparatus.—In Bulletin No. 23, of the Station, in treating of the best means of spraying apple trees for preventing the ravages of the Apple Worm or Codling Moth, I have given some account of the machinery required in connection with the use of the arsenites. On large trees and for orchards the same machinery will apply for the use of the washes and emulsions just treated of for scale-insects, and may be repeated here.

A good, strong double-acting force pump should be purchased and mounted on a large stout barrel with the supply tube reaching well down to the bottom. It has become the custom to mount the pump in the end of the barrel, but except in the case of the Nixon Tripod, it will be almost as easy to mount it on the side of the barrel, which is easily held in place by a skid near either end, and is then more compact and stable than when standing on the end while the handle of the pump comes lower and is more easily worked.

It will be well to buy the pump without the attachments. About 25 feet of ½ inch cloth insertion rubber tubing is attached to the discharge

orifice, or to each of the orifices in case there are two. To the end of the tube is fitted one of the modifications of the Cyclone or Riley nozzle and the outer 8 or 10 feet are clamped or wired to a light pole or bamboo fishing rod for convenience in elevating the nozzle into the larger trees. The tank or barrel is mounted on a cart or sled and driven between the tree rows, one man driving and pumping and other holding and directing the extension pole and nozzle.

I have mentioned the cyclone nozzle for the reason that, all things considered, I believe it, in some of its modifications, to be the best for orchard work. The Climax nozzle manufactured and sold by the Nixon Nozzle & Machine Company is also a good nozzle, but it is rather large and clumsy, its spray hardly so fine, and it will not answer for fungicides containing lime, since it clogs easily. The Vermorel modification of the Cyclone nozzle possesses a little attachment which quickly unclogs the orifice when once stopped up, and is therefore preferable. Moreover, neither the Cyclone nor the Vermorel modifications is patented, which, other things being equal, is in their favor. Both are manufactured by Thomas Somerville & Sons, Washington, D. C., and Robert Leitch & Sons, also of Washington, or may be made by any brass and iron worker from the descriptions in my official reports.

For application to nursery stock or to smaller trees one of the smaller hand-pumps advertised by various manufacturers, especially pump-makers, as hydronets or aquapults, will answer the purpose, though better still would be the use of what are known as knapsack pumps.—The price of these ranges from $10.00 to $20.00.

IMPORTANCE OF THE MATTER: FINAL ADVICE.

It is very doubtful whether the fruit-growers of the Eastern States or whether those of Maryland have yet awakened to a realization of the importance of taking active measures to stamp out if possible, this pernicious scale-insect, or at least to protect from it trees not yet affected. It has been introduced within comparatively few years, and there is therefore, an excellent chance of restricting its range, or of ridding particular orchards of it. Prof. J. B. Smith, Entomologist of the New Jersey Experiment Station, has issued a special bulletin upon the insect, which is more widely distributed in that State than elsewhere in the East and which, in fact, as we have already seen, has been largely distributed to other parts from that State. He closes his bulletin with a series of recommendations which have been very widely distributed and even copied in the official bulletins of other states, and which, though excellent in themselves, are, I fear, rather calculated to discourage those who have extensive orchards to disinfect. The chief of these recommendations are as follows:

First. Every orchard that has been set out within the last six years should be thoroughly examined to ascertain whether or not the scale is present.

Second. If it proves to be present and is confined to a few trees, the trees had better be taken out and destroyed, unless the infestation is so slight that the trees can be gone over with a stiff brush and all the scales actually brushed off.

Third. If the orchard is young, and the trees are not too large to be handled, it will be best to use a stiff brush and, taking each tree separately, brush off all the scales. This looks like a good deal of mechanical work; but it will pay in the end. It can be done at any time during the winter; it will be absolutely effective and, with care, there need be no further trouble from this insect in an orchard so treated.

Fourth. If the trees are too numerous to be treated by hand, or are too large to be conveniently handled, prune back liberally, removing as much wood as the tree can easily spare. The cuttings should be carted off and burnt as a matter of precaution, and what remains of the trees should be washed with the potash solution above described. This should be done as soon as may be, and a month later, during a moderately mild spell, the trees should be again treated, this time with the kerosene emulsion, made as above described and diluted five times. The object of this double treatment is, first, by means of the potash to dissolve or corrode the scales to a greater or less extent, and to kill off a considerable proportion of the insects themselves. At the end of a month the potash will probably have been washed down and all dissolved away, so as to exert no further action. The scales, however, will be thinned down, riddled or loosened from their hold, and an application of the kerosene emulsion then made will give it abundant opportunity to reach the insect. If both these materials are applied thoroughly, the kerosene will finish any work left undone by the potash and not a single specimen need escape.

I have serious doubts whether anything is to be gained by the stiff brush treatment urged by Prof. Smith, involving, as it does, an infinite amount of labor and the severe pruning which he conjoins with it, since crushing off the scales is impracticable on the smaller twigs and branches. Any winter wash that is effective will obviate the necessity for this preliminary labor.

The other treatment recommended is most valuable, but requires two sprayings, viz., one of the potash solution and one of the kerosene emulsion. *As a result of later experiments the past winter, as set forth in this bulletin, it becomes evident that any thorough spraying of the two-pound-to-the-gallon-solution of the whale-oil soap will be perfectly effective, and may be depended upon as a substitute for the treatment urged by Prof. Smith.* Cost of materials and convenience in obtaining will otherwise influence each individual in the choice of the comparatively few satisfactory winter washes, as indicated in this bulletin.

THE SAN JOSE SCALE.

A SERIOUS AND RECENT IMPORTATION INTO MARYLAND.

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MARYLAND

Agricultural Experiment Station.

BULLETIN NO. 33.

Horticultural and Agricultural Departments.

Small Fruits, Vegetables and Field Corn.

COLLEGE PARK, MD.

April, 1895.

MARYLAND

Agricultural Experiment Station.

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NOTICE.

The bulletins of the Station will be mailed free to any citizen of Maryland who sends his name and address to the station for that purpose.

Correspondents will please notify the Director of changes in their post-office address, or of any failure to receive the bulletins.

ADDRESS,
MARYLAND AGRICULTURAL EXPERIMENT STATION,
COLLEGE PARK, MARYLAND.

Results of Experiments Conducted by the Horticultural Department.

FOR THE SEASON 1894.

By James S. Robinson, Horticulturist.

INTRODUCTION.

The growing of the different fruits and vegetables for market is at present a leading Agricultural interest in this State, and while it has already assumed large proportions, yet the areas devoted to this culture are increasing year by year, which gives evidence of the fact that there are larger expectations of profit in this than in the lines of staple Agriculture. The natural adaptability of Maryland's soils and climate, coupled with the fact that through the quickness of dispatch, the markets of the country, East, North and West, are accessible to us, give an array of facts which have contributed, not only to the rapid spread of this interest, but are in themselves the conditions of success in this department of pursuit, not equalled by any section of the country.

Baltimore City, while a good local market, is to-day the largest center of distribution of fruits and vegetables on the continent. For a number of years this interest in the State was confined mainly to a small section of territory adjacent to Baltimore city, with Baltimore as the local market. The first shipment of berries outside the State was made in 1842, by Richard Crisp, a very intelligent and successful culturist, with Philadelphia as the objective point. Mr. Crisp made a fortune in a few years, by continuing this enterprise. The fact of success and profit gave a wonderful impulse locally to this interest. In 1855 the venture was made to New York. To-day shipments by car loads to Boston, Montreal and Chicago, with all intermediate points, are of daily occurrence during the different fruit and vegetable seasons. The profits from these shipments depending absolutely upon the conditions of the consignments upon arrival, and hence the necessity for the exercise of the best care and judgment and the most approved methods of gathering, handling and shipping. The use of the refrigerator cars is an absolute necessity where the profits of distant markets are desired.

The first peach orchard on the Eastern Shore of Maryland, from a commercial stand-point, was planted in Cecil county, in 1835, by Mr. Cassiday, a gentleman from Philadelphia. This venture was as profitable with peaches as the other just referred to was with berries. To-day the culture of market products is the dominant interest of the eastern and middle sections of Maryland, and it is spreading rapidly to the southern portion of the State; while in certain sections of the western part of the State, cultivation of fruits has been exceptionally profitable.

The markets have often been and are liable to be depressed, not by the quantity, but by the quality and condition of the products offered.

Proper preparation of the land, judicious selection of varieties, timely and most economic methods of cultivation, intelligent judgment in gathering, handling and shipping, applications of suitable plant foods at the proper time, combating against the low forms of vegetable and animal life, are the necessary conditions for success—these considerations have constituted the underlying basis of our experimental work.

STRAWBERRIES.

Of the small fruits the strawberry is receiving by far the greatest share of public attention. The strawberry makes provision in the growth of one season for the fruit crop of the next, and the land intended to be planted should be in the finest condition of tilth and fertility. To prepare the land for this crop, and every other crop grown at the Station, after plowing we run over the land a home-made rubber, an inexpensive, but very efficient implement. It is made by bolting together with three three-quarter (¾) inch bolts, with screw tap on one end of each bolt, six pieces of oak scantlings, three by four, six feet long. The holes for the bolts are bored through the opposite edges of the scantlings, (the diagonal) twelve inches from each end and one in the center, and the six pieces bolted together, the two outside bolts have eye-heads for the attachment of the team. On the front of each piece and flush with the edge of each scantling that rests on the ground fasten plates of iron, old buggy or cart tires answer admirably—this protection gives the rubber a better capacity for pulverizing the clods, and saves the cutting edges of the scantlings from being worn unequally. With two or three horses attached to this implement after going over the field, it will be in such a preparation, not only of tilth, but in the best possible condition for the subsequent convenient working of the newly set plants. Mark the rows out with a small turn-plow about three inches deep, at a distance apart of four feet from bar to bar and set plants according to habit of growth of variety, twenty to thirty inches for the early varieties, such as, Meeks, Michael, or Ella, which are rampant growers, and likely under favorable conditions of making too dense a mat; and from fifteen to eighteen inches in the row for varieties such as Lovett, Gov. Hoard, Bubach, No. 5, Haverland or Sharpless.

The best time to plant is as early in the Spring as the land is in proper condition and plants can be secured. The earlier a set can be obtained, the better the chance for a crop, both in quantity and quality.—Plants that make in the late fall with their poor root system and weak crown developments, had generally be better out the way of the earlier plants.

On account of its late ripening and fine appearance, the Gandy is being largely planted. Plants of this variety should be set closer in the rows than most of the market berries. The Gandy is a poor setter of plants unless conditions are very favorable, and requires higher culture than many of the leading market varieties, as owing to the late period of its ripening, it often catches the drouths of early summer.

The best results, both as to quantity and quality of crop, are generally had on newly-cleared land. Virgin soil with its years of stored fertility and accumulated vegetable matter, affords the best physical condition of the soil for a satisfactory quality and quantity of crop; this, however, is only practical in the older settlements to a small extent, but the requirements can be in a measure approximated. If a piece of land intended for strawberries were worked in a summer crop, and at the last working crimson clover were sown, and this plowed down as the heads were browning next season, and on this fallow cow peas were sown, to be turned down at the proper time, it would be an inexpensive preparation for filling the soil with vegetable matter, as a guard against either drouth or excessive rainfall at the critical time of fruitage. The use of commercial mixtures as plant food in our experimental work with strawberries, warrants the conclusion that it is better to make the application of different foods and at different times. Formulas for these experiments have always been arranged by Prof. Patterson, Chemist of the Station. I am very frequently written to for formulas for special crops, I invariably hand them to the chemist, and will take this occasion of saying that it is a pleasure always to comply with these requests, and very gratifying to have received from time to time so many testimonials of the efficiency of the applications. I will name one of the many. Mr. Thomas H. Arnold, an intelligent, successful and extensive grower of strawberries, in Anne Arundel county, applied last Spring for a formula as a top dressing for his berries, using it experimentally, he was so well satisfied with the result that he used it this spring on his entire crop. We are satisfied that the best results would follow by using two applications, one at time of setting plants, another in the very early spring before the expected fruitage. Among the largest of the commercial growers, the practice obtains of top dressing the beds in the fall with stable manure. The practice is a good, but very costly one, as the supply of manure has to be mainly bought and freighted either from Washington or Baltimore. An experiment was conducted on the line of this custom, an application of stable manure at the rate of a car load to the acre, costing $31.00 per acre, was tried alongside and with the same varieties with commercial mixture, costing at the rate of $7.00 per acre, with the advantage of growth of vines, earlier maturity of fruit and quality of fruit, decidedly in favor of the commercial mixture. Availabilty of plant food at the critical time will count as a factor against quantity slowly available.—Appended are formulas suggested, with directions for use, and the reasons therefor. On the matter of fertilizers for this special crop, as it is a subject of such general interest, I will insert a communication prepared by Professor Patterson, in which he says:

"In previous articles it has been shown that the composition of a crop was not a true basis upon which to formulate a fertilizer for that crop, and that more depended upon the soil and its natural fertility than upon the crop, yet an understanding of the relative feeding propensities of various crops, aids very materially in making preparations for that

crop and in supplying the necessary plant foods. The character of the plant food supplied must depend upon the time of its application, the rapidity with which it is to be made use of, and upon the nature and character of the growth to be produced.

The relative amounts of the different plant foods used by the strawberry vine and fruit are shown by the following figures:

	FRUIT. per cent.	VINE. per cent.
Total mineral matter	0.60	3.34
Phosphoric acid	0.11	0.48
Potash	0.30	0.35
Nitrogen	0.15	1.00

The time of application of fertilizers to strawberries may be divided into two general classes:

1st. Application to be made before or at the time of setting the plants.

2nd. Application to beds already set and to old beds.

A study of the conditions surrounding these two classes, the kind of growth that is expected and the rapidity with which the growth is to be made, makes it almost self evident that different proportions of the plant foods should be used and that the degree of availability of the foods should be varied.

As a rule the general preparation of land that is to be cultivated in strawberries is not what it should be, or what the strawberry culturist will ultimately have to come to, but taking the average conditions with the most typical soils cultivated in strawberries in Wicomico and Anne Arundel counties, the following general principles will be found to apply:

1st. In new beds it will be necessary to apply fertilizers that will contain a percentage of all three plant foods, that these plant foods should be in such a condition of availability as to give the plants a quick and good start, and that it will then gradually become available and keep the plants in a good, strong, healthy condition, and promote the formation of runners so as to give the desired stand.

For old beds and beds already set it will generally be found best to apply the fertilizers in the early spring, as soon as they begin to grow.—At that time it is desirable to produce a quick growth and to give such plant foods as are most likely drawn upon in the functions of reproduction and growing fruit.

The following fertilizing ingredients, mixed in the proportions given, will be found to about meet the conditions above expressed and be applicable to the soils upon which strawberries are grown:

FOR NEW BEDS.

To be worked into the row with a cultivator before setting the plants.

Dissolved South Carolina rock	1000 lbs.
Fine ground dried fish or Tankage	600 lbs.
Nitrate of Soda	100 lbs.
Muriate of Potash	300 lbs.
	2000 lbs.

Apply at the rate of 400 to 600 lbs. per acre. The Soluble Phosphoric acid of rock, the Nitrogen of the Nitrate of Soda, and the Potash, will be readily and immediately available to the plants and will give them a good start. The fish will yield its Nitrogen and Phosphoric acid gradually, and, with the Phosphoric acid of rock and Potash from the Muriate, will keep the necessary foods constantly at the disposal of the plants.

FOR OLD BEDS.

To be applied early in the spring by sowing along the rows close to the plants and working into the soil lightly, with hoe or cultivator.

Dissolved South Carolina rock	1100 lbs.
Dried blood	200 lbs.
Nitrate of Soda	400 lbs.
Sulphate of Potash	300 lbs.
	2000 lbs.

Apply at the rate of about 300 lbs. per acre. The mixture will give all the plant foods in a very available condition and furnish the materials necessary for the drain in producing bloom and growing fruit.

A bed that has been set in spring, and has not done well, may often be revived and aided in the formation of runners, if an application such as recommended for old beds be applied at the time of the fall working.

It will sometimes be found that too large an amount of nitrogenous plant food will cause a very dense growth of vine and leaf, which will prove detrimental by excluding the sun and holding moisture, thus causing the fruit to ripen slowly and unevenly and often causing it to rot."

As to cultivation, two systems obtain: one is to depend upon annual plantings plowing down after the first crop; the other is to work out the old beds, taking from them two or more crops; the latter custom generally obtains. The question is mainly one of economy of time and labor; with the specialist or amateur, the first system may be easily followed, but with the general trucker on a large scale, with a diversity of interests and whose acreage often amounts to fifty or one hundred in berries, the annual preparation and planting on such a scale for the one crop coming at a time when the demand on the trucker's time and attention are urgent in many directions, is a matter of considerable

moment, since he can at a later date, when less pressed for time, work out his old beds, having often on hand an abundance of labor in the hands who have gathered the crop of berries, and in this way be enabled to maintain a normal acreage. The method of procedure often obtaining is to bar off the old beds with a plow, and after a few days throw the furrows back, plow out the middle, cultivate down, pull out the weeds that might have sprung up, and if the cultivator is used from time to time, the old beds thus treated and properly fertilized will often give as good results as the annual plantings. A more expeditious way and consequently cheaper is to use an ordinary shovel plow, substituting narrow hoes called bull tongues in place of the shovels. These will pulverize and put the middle of the rows in order on a given space in one-third the time required with the turn plow, and if a short rubber four feet long, similar in construction to the plan before given, except to bolt four pieces of 4x4 scantling, instead of six, be provided and arranged to have the horse draw this endwise instead of by the broad side as in the other case, the result will be both satisfactory and economic.

ACKNOWLEDGMENTS.

Plants of new varieties of strawberries were sent to the Station for trial by the following gentlemen: Mr. E. T. Ingram furnished us with the Brandywine and Mary. The Brandywine is a plant of exceptionally strong and vigorous habit of growth, productive in yield, berries large, firm, good flavor and very attractive in appearance. The Mary gave excellent promise in the early part of the season, growth of vines all that could be desired, set of fruit was fine, about the time for ripening, however, the vines blighted very badly.

From Mr. John Tubb we received the "John Tubb's Strawberry," which gives excellent promise of a first-class general purpose berry; vigorous plant, prolific bearer, good flavor, fairly early, firm, attractive in appearance and good size.

From Mr. J. Hall, a seedling not named; this plant was a strong grower, prolific yielder of early fruit, medium size.

From Mr. William J. Allen, two seedling varieties, unnamed; plants of vigorous habit of growth, fairly productive, fruit attractive, good flavor, but inclined to be soft.

From D. W. Hollingsworth, the Lady-finger Strawberry, the fruit was very fine, but was small in yield.

Ninety-five different varieties of strawberries were in fruit the spring of 1894. Additional plantings of varieties were made in 1894, and we expect to have in bearing 140 different varieties in the trial plots for the Spring of 1895.

Best Early Varieties:—Of the extra earlies I would name the Meek, Michael and Ella. The Ella, with us, is the same type, but more prolific than the Michael; the Meek is the largest, firmest and best shipping berry of the lot.

Late Varieties:— Of the later varieties, Van Deman, Bubach No. 5, Haverland, Barton's Eclipse, Lovett, Staymans No. 1, Great Pacific,

Crescent, Governor Hoard, Charles Downing, are varieties of merit. As preferable of the latest varieties tested, would name Gandy and Kentucky on light soils with good culture. The Kentucky is one of the best and most reliable of the late market berries, and is planted very extensively for shipment in the strawberry section near Baltimore.

GATHERING AND HANDLING THE CROP.

If growers were generally impressed with the difference it makes to them in profits between berries in and out of condition when offered for sale, a radical change would surely take place in the general handling of this crop. This fact usually determines whether the berries are disposed of on an overloaded home market or sent to distant points in advance of their local supply. The pickers should be furnished with covered trays, not only to protect the gathered fruit from the heat of the summer sun, but as a guard against bruising the fruit in carrying it from the field to the packing shed. No fruit that has been heated and bruised in handling, and then packed in the crates in this condition, is fit for shipment to a distant point. Low prices and glutted markets is the inevitable sequence.

BLACKBERRIES.

Varieties:

Early Harvest,
Wilson, Jr.,
Erie,
Lucretia,
Early King,
Taylor's Prolific,
Kittatinny,
Wilson,
Snyder,
Lawton,
Minnewaski.

We expect to have in fruit this season: Maxwell, Topsy or Tree Blackberry, Lovett, Eldorado, Kent and Duncan Falls.

Of the varieties tested, Early Harvest, Wilson, Jr., Erie and Lucretia gave best promise of profitable results. The suggestions as to fertilizing culture and handling the strawberry, apply equally well not only to the blackberry, but to all of the fruits. Blackberries thrive best on light, rich soils. The Early Harvest should be pruned closer than any of the varieties named, for best results.

RASPBERRIES.

Varieteis:

Brandywine,
Turner,
Cuthbert,
Golden Queen,
Hansel,
Marlboro,
Stayman's No. 5,
Thompson's Prolific,
Thompson's Early Pride,
All Summer,
Souhegan,
Kansas,
Ohio,
Lovett,
Gregg,
Cromwell,
Progress,
Smith's Prolific,
Older,

In addition to the above varieties, King and Royal Church should fruit this season.

There is a profitable shipping demand for both red and black raspberries. Of the reds in the experimental grounds, the best promise is with the Brandywine, Turner and Cuthbert; of the black, with Souhegan and Kansas. Raspberries thrive better on a heavy loam than on light soils.

GOOSEBERRIES.

Varieties:

Downing.
Golden Queen.
Houghton.

Downing gave us best results.

CURRANTS.

Fay's Prolific,
Red Dutch,
White Grape,
Versailes,
Lee's Prolific.
Victoria,
Cherry,
Crandall,
Black Naples,

Fay's Prolific, Red Dutch and White Grape were our best varieties.

GRAPES.

In the vineyard there are now over a hundred varieties. Would name among those which have proven especially valuable:

Wyoming,
Woodruff,
Merrimac,
Niagara,
Hays,
Delaware,
Concord,
Brighton,
Worden,
Wilder,
Salem,
Moore's Diamond,
Eaton,
Moore's Early,
Agawam,

TOMATOES.

Varieties:

Stone,
Buckeye State,
Climax,
Fordhook First,
Beauty,
World's Fair,
Truckers' Favorite,
Matchless,
Turner's Hybrid,
Golden Queen,
Paragon,
Early Optimus,
Advance,
Long Keeper,
Ten Ton,
Volunteer,
Pefection,
Ignotum,
Ponderosa,
Dwarf Champion,
Tree,
Red Cherry,

Peach,	Red Pear,
Prize Winner,	Terracotta,
Yellow Plum,	Mill's Earliest,
Lemon Blush,	Husk Tomato,
Trophy.	Acme.

For a general purpose tomato would name the Stone. For a late and very abundant yielder, Buckeye State. Reliable market varieties, Climax, Beauty, Truckers' Favorite, World's Fair, Matchless and Fordhook First.

CANTALOPES.

Varieties Planted:

Netted Gem,	Emerald Gem,
Cole's Anne Arundel,	Surprise,
Baltimore Nutmeg,	Delmonico,
Montreal Green Nutmeg,	Melrose,
Beck's Columbus,	Banquet,
Champion Market,	Bay View,
Jenny Lind,	Perfection,
Prolific Nutmeg,	Orange Christianna,
Hackensack,	Miller's Cream.

As to quality of the green fleshed melons, would name, Netted Gem, Cole's Anne Arundel, and Baltimore Nutmeg; of the yellow fleshed melons, Emerald Gem, Delmonico and Surprise.

WATERMELONS.

Varieties:

Kolb's Gem,	Cuban Queen,
Florida Favorite,	Mammoth Ironclad,
Boss,	Volga,
Hungarian Honey,	Kentucky Wonder,
Rocky Ford,	Girardieu Favorite,
White Icing,	Gipsy,
Fordhook,	Jumbo,
Gray Monarch,	Ruby Gold,
Lord Baltimore,	Pride of Georgia,
Ice Rind,	Seminole,
Green and Gold,	Dark Icing,
Delaware,	Dixie,
Arkansas Traveller.	

For market purposes Kolb's Gem would be the favorite on account of its shipping qualities; for home use Florida Favorite, Boss, Hungarian Honey, Rocky Ford, Lord Baltimore and Arkansas Traveller.

PEACHES.

Notwithstanding the disastrous freeze of the 26th of March, 1894, there was a partial crop of the early and of the red peaches.

APPLES AND PLUMS.

Apples and plums were a failure on account of the freeze of the 26th of March.

PEARS.

A number of the pears fruited and the specimens were exceptionally fine. This was particularly true of the Keifer, Lawrence, Leconte, Vicar, Duchess and Seckel.

CABBAGE.

This is an important market crop in Maryland, and is grown very extensively in the neighborhood of Baltimore and Washington. The best demands of the market for cabbages are generally for the early and late varieties. Two methods of procedure obtain as to growing the plants; one is to sow the seeds in open beds about the 15th of September and transplant to the fields about the last of November or first of December, on the north side of ridges running east and west. The ridges are made by throwing the earth together with a two horse plow. The plants should be set about five inches below the crest of the ridge and planted deep enough to close the outer leaves over the bud for its protection. The time of planting is important; if the seeds are sown too early the plants will get too large, and the tendency to go to seed increased; if transferred to the fields too soon and fall growth takes place to any extent, the plants, instead of heading up in spring, will very often go to seed. The aim should be to plant out in the field only soon enough for the plants to get established, and not to make growth, as the cabbage is a biennial and after a period of rest its tendency is to make seed. Sometimes the plants are transferred to cold frames, wintered over in this way and transplanted in the fields in early spring. Another practice is to sow the seeds in hot beds in February; set out the plants in spring when large enough and weather permits. The cabbage is naturally hardy, and will do well when planted out in the fall as far north as the latitude of New York City. Both practices we think are open to objection; the fall set plants beside the tendency to seed will be in a measure stunted by the winter exposure. The transferring of the plants to cold frames is an unnecessary handling. The use of the hot beds, besides requiring constant attention, makes the plants so tender that the time of planting must necessarily be deferred in the spring. The method we prefer and think a better one than either; it is to prepare a cold bed in fall before the ground freezes, and cover it with sash that it may be accessible at any time, and in December, or not later than the first of January, sow the seed both of cabbage and lettuce. Until the plants get well established throw over the sash at night some loose straw. With very little attention the plants will be large enough to put out as soon in the spring as the ground can be worked, and will start to grow better than either fall set or hot-bed plants. This easy and simple plan of growing the plants would be as applicable for the home garden as for the market trucker. Nitrate of soda generally gives first-

class results applied to spring cabbage at the rate of 150 lbs., to the acre, mixed with 100 lbs. of plaster, and applied as a top dressing around the plants at the time of the first working.

Varieties tested the past season:

Early Jersey Wakefield,	Foetler's Brunswick,
Large Early Summer,	Succession,
All Head,	Flat Dutch,
All Seasons.	

They are all cabbage of merit. If it is desired to force the growth of the plant beds, the following solution of watering the plants will be found of value:

1 lb. Nitrate of Soda,
1 lb. Sulphate of Potash.
1 lb. Sulphate of Ammonia,
1 lb. Double Super Phosphate,

In 48 gallons of water, with which water the beds as occasion seems to require.

LETTUCE.

Varieties:

Baltimore Cabbage,	Early Forcing,
Denver Market,	Boston Market,
New Iceberg,	Golden Ball,
Tennis Ball,	Burpee's Hardhead.

These are all fine varieties. The plan given for growing cabbage plants applies as well to lettuce. The sash used for the transplant beds for tomatoes and for bedding sweet potatoes, melons and egg plants, could often be very profitably employed in growing an early crop of lettuce before needed for the other service. An early lettuce crop would frequently pay well for shipment not only to home but other markets.

CAULIFLOWER.

"The Model," the seed of which was sent to the Station by Northrop, Braslan & Goodwin, was our best variety of cauliflower, and was exceptionally fine.

PEAS.

Varieties:

Extra Early,	Premium Gem,
William Hurst,	Laxton's Earliest of All,
Burpee's Profusion,	Dwarf Sugar,
Tall Sugar,	American Wonder,
Burpee's Quantity,	Burpee's Quality,
Sapphire,	Bliss' Abundance,
Duke of Albany,	Shropshire Hero,
Renown,	Echo,
Improved White Marrow,	Alaska,
Triumph,	French Canner.

The best market peas for the canning trade are White Marrow, Alaska and Triumph. French Canner is a fine table pea, as well as the other varieties named.

SWEET POTATOES.

Varieties:

Early Jerseys, Up Rivers,
Queen.

The Early Jersey is a very fine market potato: the merit of the Up River is its extreme earliness and the consequent price it commands on the market. The Queen is a good yielder, a very handsome and salable potato. The Jersey is a better keeping potato than either of the others.

Agricultural Department.

CORN EXPERIMENTS.

By Robert H. Miller and E. H. Brinkley.

The following experiments were made with corn the season of 1894:

No. 1. Fertilizer test.
" 2. Testing width of rows where corn is drilled.
" 3. Deep vs. shallow cultivation.
" 4. Frequent vs. unfrequent cultivation.
" 5. Drilled vs. checked corn.
" 6. Comparative value of manures.

THE SEASON.

The season of 1894 was not a favorable one for the corn crop. During the four months of May, June, July and August, there was only about one-half the normal rain-fall, which was very unevenly distributed. The precipitation for May was above the average; while June had little more than one-quarter the normal for that month, and July and August had only about one-half the usual rain-fall.

FERTILIZER TEST.

The land on which this and the three following experiments were tried was a worn out sod, having produced a crop of very indifferent hay the previous season.

The soil is a stiff loam, underlayed with clay; it was plowed January 5, and a light top-dressing of street sweepings was evenly applied with a manure spreader; twenty bushels of stone lime to the acre was also applied. The seed bed was thoroughly prepared by the use of spring tooth harrow and rubber.

The plot on which the fertilizer experment was tried was sixty feet wide; on one-half of this, three hundred pounds of fertilizer per acre was drilled in immediately before planting the corn, which was composed as follows:

500 lbs. dissolved South Carolina rock.
300 lbs. dried fish.
200 lbs. nitrate of soda.
200 lbs. muriate of potash.

This mixture costing $28 per ton.

The corn was drilled, the rows being three feet, nine inches apart, and one stalk left every eighteen inches. The variety in this and the succeeding tests was the same as was used in the tests last year, a large eared yellow corn, the seed having been obtained of Mr. J. P. Silver, of Harford County, Maryland. The crop was worked five times.

In the following table will be found the yields of corn and fodder in the respective plots:

TABLE 1.

FERTILIZED VS. UNFERTILIZED.

Yield of Corn in bushels and Fodder in pounds per acre.

	Hard. Bus.	Soft. Bus.	Total. Bus.	Fodder. Lbs.
Fertilized	39.0	5.4	44.4	1118
Unfertilized	31.7	4.6	36.3	1060
Gain from fertilizing	7.3	.8	8.1	58

As will be seen, the plot which was fertilized gave a total yield of 8.1 bushels to the acre more than the unfertilized plot; but as the feltilizer used, cost at the rate of $4.20 per acre, it will be seen that the increased yield was not sufficient to cover the expense of fertilizing.

TESTING WIDTH OF ROWS WHERE CORN IS DRILLED.

The plot used in this experiment was immediately adjoining that used in the fertilizer test. It was prepared for planting, and cultivated in the manner described in that test.

It was planted in alternate sections of wide and narrow rows, wide rows, five feet, narrow rows, three feet, nine inches, there being four rows in each section, and six sections in all—three of wide and three of narrow rows.

The corn, "Silver Yellow," was drilled in May 1st. In the wide rows it was thinned out to one stalk to every twelve inches, and in the narrow rows one stalk to every fifteen inches. This leaving approximately the same number of stalks per acre in each plot.

The following table gives the relative yields of corn and fodder:

TABLE 2.

WIDE VS. NARROW ROWS.

Yield of Corn in bushels and Fodder in pounds per acre.

	Hard. Bus.	Soft. Bus.	Total. Bus.	Fodder. Lbs.
Wide rows	34.7	4.2	38.9	2280
Narrow rows	40.0	5.3	45.3	3485
Gain from narrow rows	5.3	1.1	6.4	1205

As will be seen from table 2, the narrow rows and thin seeding gave a yield of 6.4 bushels in excess of the wide rows and thick seeding. In the test for 1893, the increase in yield from narrow rows was 5.8 bushels to the acre.

DEEP VS. SHALLOW CULTIVATION OF CORN.

In this experiment the preparation of the land was similar to that described in the last test, and the corn was planted the 2nd of May, the rows being three feet, nine inches apart, and the corn drilled one stalk to every fifteen inches.

There were four sections of six rows each used in this experiment. Sections 1 and 3, were worked five times with double shovel to a depth of about seven inches, and sections 2 and 4, were worked the same number of times, and cultivated to a depth of about three inches.

The following table gives the comparative yields of corn and fodder per acre:

TABLE 3.

DEEP VS. SHALLOW CULTIVATION OF CORN.

Yield of Corn in bushels and Fodder in pounds per acre.

	Hard. Bus.	Soft. Bus.	Total. Bus.	Fodder. Lbs.
Deep cultivation.....	34.2	5.7	39.9	2755.5
Shallow cultivation.....	34.5	6.3	40.8	3325.5
In favor of shallow.....	.3	.6	.9	570

As will be seen from Table 3, there was only a gain of .9 bushels to the acre from the shallow working; the season of 1893, the gain from shallow working was 7.7 bushels.

FREQUENT VS. UNFREQUENT WORKING OF CORN.

There is quite a diversity of opinion among farmers as to the amount of cultivation that it is profitable to give corn, some claiming that the land should be frequently stirred every week or ten days, while others hold that any cultivation more than is necessary to keep down the weeds is not profitable. With the object of throwing some light on this point this test was made.

The corn was planted May 2, the rows being three feet, nine inches, and the stalks fifteen inches apart in the row. On one-half the plot the corn was worked three times on the following dates: May 17, June 8 and June 28; on the other half it was worked five times on the following dates: May 17 and 29, June 8, 16 and 28.

The following table gives the yields of the respective plots:

TABLE 4.

FREQUENT VS. UNFREQUENT WORKING OF CORN.

Yeild of Corn in bushels and Fodder in pounds per acre.

	Hard. Bus.	Soft. Bus.	Total. Bus.	Fodder. lbs.
Frequent.....	33	6.5	39.5	3191.5
Unfrequent.....	35.7	5.4	41.1	2889.5

From Table 4 it will be seen that there was a very small gain in corn (1.6 bushels per acre) from the unfrequent working, while with the fodder the frequent working gave slightly the larger yield.

The cost of the two additional workings which the frequent cultivation received must not be lost sight of in comparing the respective results.

DRILLED VS. CHECKED CORN.

The land on which this test was made had been in wheat the previous year, and had been seeded in grass; but owing to the combined effects of a very heavy crop of wheat and extremely dry weather, a very poor set was secured, and it was deemed best to plow it up.

The land was prepared as described in previous tests and the corn planted May 16. Owing to a want of uniformity in the land the plot was divided into three sections; on the middle section (embracing half of the plot) the corn was drilled, the rows being laid off four feet wide, two grains being dropped in a place every fifteen inches, which was afterwards thinned out to one stalk. On each end of the piece, each of which embraced one-fourth of the plot, the corn was planted in check, the rows being three feet, nine inches, by four feet—two stalks being left in the hill.

Both drilled and checked corn received five workings; the last one being a very shallow one to cover crimson clover seed which was sown.

TABLE 5.

DRILLED VS. CHECKED CORN.

Yield of Corn in bushels and Fodder in pounds per acre.

	Hard. Bus.	Soft. Bus.	Total. Bus.	Fodder. Lbs.
Drilled	59.3	3.5	62.8	3291
Checked	55.9	2.8	58.7	3190
In favor of drilled..	3.4	.7	4.1	101

As will be seen from Table 5 the drilled corn gave a yield of 4.1 bushels of corn and 101 pounds of fodder to the acre more than the checked corn.

COMPARATIVE VALUE OF MANURES.

This experiment was a repetition of the one described in bulletin 25, March, 1894: "Ascertaining the comparative effects of two different manures on a crop of corn; the one made from steers that were fed a well balanced ration, the other from those fed a poorly balanced ration." The well balanced ration was constructed as follows:

15 lbs. Corn and cob meal.
4 lbs. Cotton-seed meal.
2 lbs. Wheat bran.

The poorly balanced ration contained neither the cotton-seed meal or bran, but simply consisted of corn and cob meal.

A light crop of rye was turned down two weeks before the corn was planted. There were six sections of three rows each used in the test. On sections 1, 3 and 5, manure from the well balanced ration at the rate of 16,613 pounds per acre was applied; and on the alternate plots the same amount of manure from the poorly balanced ration was applied; the subsequent treatment was the same in every particular.

The following table gives the results of the experiment:

TABLE 6.

CORN GROWN WITH MANURE FROM A WELL BALANCED RATION, AND ALSO WITH MANURE FROM A POORLY BALANCED RATION.

Yield of Corn in bushels and Fodder in pounds per acre.

	Hard. Bus.	Soft. Bus.	Total. Bus.	Fodder. Lbs.
Well balanced ration.....	25.5	4.7	30.3	2244
Poorly balanced ration...	22.5	3.7	26.7	2499

As will be seen from table 6, there was a gain of three bushels of corn to the acre from manure of well balanced ration; while the manure from poorly balanced ration gave 255 pounds of fodder to the acre more than well balanced.

AGRICULTURAL DEPARTMENT.

EXPERIMENTS WITH CORN, SEASON OF 1894.

By Robert H. Miller and E. H. Brinkley.

SUMMARY OF RESULTS.

1.—**An application of 300 lbs. of fertilizer on Corn increased the yield 8.1 bushels per acre, but the increased yield was not sufficient to pay for the application of the fertilizer.**

2.—**In the test of wide and narrow rows, the narrow rows gave an increased yield of 6.4 bushels.**

3.—**Shallow cultivation of Corn gave a slightly better yield than deep cultivation.**

4.—**Corn which was cultivated three times, yielded 41.1 bushels per acre; that which was worked five times, yielded 39.5 bushels per acre.**

5.—**Drilled corn gave a rather better yield than checked corn.**

6.—**Manure from a well balanced ration made slightly more corn per acre than manure from a poorly balanced ration.**

MARYLAND

Agricultural Experiment Station.

BULLETIN NO. 34.

SPECIAL ISSUE.

COMPOSITION OF

COMMERCIAL FERTILIZERS

SOLD IN THIS STATE.

COLLEGE PARK, MD.

JULY, 1895.

MARYLAND

Agricultural Experiment Station.

ADVISORY COMMITTEE OF BOARD OF TRUSTEES.

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Located on the B. & O. R. R., 8 miles N. of Washington, D. C.

NOTE: Under the laws of Maryland, the Inspection, sampling and analysis of commercial fertilizers is to be done under the auspices of the Maryland Agricultural College, by the Professor of Chemistry of the College, who is ex-officio State Chemist. The results of these examinations, being agricultural information of value and general interest, will be published, from time to time, as Special Bulletins, from the Maryland Agricultural Experiment Station.

These Bulletins will be mailed, free, to any farmer who asks for them.

ADDRESS,
MARYLAND AGRICULTURAL EXPERIMENT STATION,
COLLEGE PARK, MARYLAND.

INSPECTION AND ANALYSIS OF

COMMERCIAL FERTILIZERS SOLD IN MARYLAND.

BY THE CHEMICAL DEPARTMENT OF THE

MARYLAND AGRICULTURAL COLLEGE.

Dr. H. B. McDonnell, *State Chemist.*
H. C. Sherman, B. S., *Assistant Chemist.*
F. P. Veitch, B. S., *Assistant Chemist.*
F. B. Bomberger, B. S , *Assistant Chemist.*
W. W. Skinner, B. S., *Assistant Chemist.*
C. C. McDonnell, B. S., *Assistant Chemist.*

IMPORTANT!

Owing to the low prices prevailing for fertilizing materials containing "Ammonia" (which are now sold in bulk for 10 or 11 cents per pound of "Ammonia") it has been found necessary to make some reductions in the schedule of "comparative values." Therefore, the "comparative values" of mixed fertilizers, as given in this bulletin, cannot be compared with those given in previous bulletins, because for the same fertilizer, with the same analysis, the "comparative value" is one dollar per ton less for each per cent of Ammonia that the fertilizer contains, and twenty cents per ton less for each per cent of potash (in the form of muriate only), than the corresponding values in the last bulletin.

The valuations remain the same on dissolved S. C. Rock and Ground Bone as before.

The schedule of valuations used to calculate the "comparative values" in this bulletin is given on a later page.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1936	Baker & Morgan, Aberdeen, Md.	High Grade Compound	Aberdeen
1937	" " "	Pure Raw Bone Meal	Aberdeen
1886	Baltimore Guano Co., Baltimore, Md.	Defiance Potato Manure	Baltimore
1885	" " "	Truckers' Favorite	Baltimore
2048	Baltimore Pulverizing Co., Baltimore, Md.	Anti-Acid Phosphate	Germantown
2049	" "	Farmers' Favorite Fertilizer	Germantown
2050	" "	Special Potato Manure	Germantown
1763	Baugh & Sons Co., Baltimore, Md.	Animal Bone and Potash Compound	Baltimore
1810	" " "	Animal Bone and Potash Compound	Baltimore
1792	" " "	Bone Meal	Baltimore
1837	" " "	"Bone Meal"	Beltsville
1805	" " "	Crop Grower	Baltimore
1744	" " "	Double Eagle Phosphate	Baltimore
1683	" " "	Export Bone	Calvert
1842	" " "	Export Bone with Potash	Baltimore
1831	" " "	Fine Ground Fish	Beltsville
1794	" " "	Fish Mixture	Baltimore
1739	" " "	Genuine German Kainit	Baltimore
1835	" " "	High Grade Acid Phosphate or Dis. S. C. Rock	Beltsville
1791	" " "	High Grade Potato Guano	Baltimore
1699	" " "	High Grade Tobacco and Truck Fertilizer	Baltimore
1982	" " "	High Grade Tobacco and Truck Fertilizer	Mechanicsville

Maryland Agricultural College, February to July, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1936	4.09	4–5	3.82	4–5	3.15	10.57	8–10	13.72	11–15	$30.66	$27.40 35.00
1937	4.95	4–5	.....	.....	.....	.....	.....	21.72	*47–52	31.84	
1886	1.18	1–2	3.66	4–5	1.79	7.73	8–10	9.52	10–12	17.55	17.80 24.20
1885	5.48	6–8	2.79	4–5	0.74	7.67	7–9	8.41	.....	28.87	30 40 39.80
2048	.....	.....	2.22	3½–4½†	1.57	4.34	4½–7	5.91	*10–20	7.19	6.25 10.30
2049	1.49	1–2	1.54	3½–4½†	2.34	4.93	4½–7	7.27	*10–20	13.33	10.30 18.10
2050	2.53	2–3	4.96	4–5	2.80	4.40	4½–7	7.20	*10–20	20.35	15.40 23.60
1763	7.35	7	7.53	7.	2.61	7.81	8.	10.42	10½	40.52	19.10
1810	2.69	2	2.38	2	2.34	9.09	8.	11.43	10½	23.06	19.10
1792	4.81	4.	.....	.....	.....	.....	.....	22.55	21½	30.85	
1837	6.09	5¼	.....	.....	7.83	9.33	.....	17.16	17.	‡28.57	26.70
1805	3.39	1.	2.59	1	1.92	8.26	8	10.18	.....	23.82	13.60
1744	2.76	2½	.95	½	4.74	8.02	8	12.76	10½	21.69	19.10
1683	3.16	2 3	2.86	2–3	6.58	7.22	11–12	13.80	.....	24.95	21.20 26.40
1842	2.06	2–3	7.24	6–7	3.66	5.62	11–12	9.28	*23–27	22.36	25.20 30.40
1831	10.92	10	.....	.....	.....	.....	.....	8.79	.....	38.03	30.00
1794	2.33	2–2½	2.32	2–2½	1.66	9.55	8–10	11.21	*20–22	21.77	18.50 22.00
1739	.....	.....	12.34	12	.....	.....	.....	.....	.....	12.34	12.00
1835	.....	.....	.....	.....	0.96	14.63	14	15.39	15	14.63	14.00
1791	5.65	5.	4.95	5.	2.43	8.35	8.	10.78	11.	33.38	31.40
1699	4.51	3.	3.82	3.	3.79	8.73	8.	12.52	10½	30.10	23.10
1982	4.34	3.	3.06	3.	1.70	8.43	8.	10.13	10½	27.22	23.10

*Bone Phosphate; divided by 2.18 to reduce to Phosphoric Acid.
†Sulphate Potash; divided by 1.85 to reduce to Potash. ‡Valued as tankage.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1832	Baugh & Sons Co., Baltimore, Md.	Muriate of Potash	Beltsville
1751	" " " "	New Process 10 per cent Guano	Baltimore
1833	" " " "	Nitrate of Soda	Beltsville
2124	" " " "	Nitrate of Soda	Forest Hill
1855	" " " "	Old Stand-by	Baltimore
1836	" " " "	Old Reliable Brand Genuine Kainit	Beltsville
1922	" " " "	Potato Fertilizer	Glyndon
1838	" " " "	P Dissolved Animal Bone	Beltsville
1761	" " " "	Special Potato Manure	Baltimore
1834	" " " "	Tankage	Beltsville
2109	" " " "	Tomato Compound	Baltimore
2086	D. Blocher & Co., Baltimore, Md.	Ammoniated Soluble Bone Phosphate	Baltimore
2087	" " "	High Grade Superphosphate of Bone	Baltimore
2092	Bradley Fertilizer Co., Boston, Mass.	Sea Fowl Guano	Baltimore
1954	Brumfiield & Foster, Colora, Md.	Acid Phosphate and Potash	Colora
1957	" " "	Hard Times Ammoniated Phosphate	Colora
1955	" " "	High Grade Acid Phosphate	Colora
1956	" " "	Special Potato, Tobacco and Truck Manure	Colora
1958	" " "	Sweet Potato, Fruit and Vine Grower	Colora
1777	J. Bullock & Son, Baltimore, Md.	Dissolved Pure Raw Bone	Baltimore
1776	" " " "	Pure Ground Raw Bone	Baltimore
2073	Chemical Co. of Canton, Baltimore, Md.	Bakers' Standard High Grade Guano	Baltimore

Maryland Agricultural College, February to July, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1832	.....	.....	49.36	50.	.....	.....	.....	.....	.....	$49.36	$50.00
1751	10.42	10–11	4.17	4–5	1.95	5.95	.....	7.90	8–9	43.74	38.80 / 43.40
1833	19.36	19.	.....	.....	.....	.....	.....	.....	.....	46.46	45.60
2124	19.20	19.	.....	.....	.....	.....	.....	.....	.....	46.08	45.60
1855	2.19	2	1.22	1	2.86	9.53	8	12.39	10½	20.95	18.10
1836	.....	.....	12.73	23†	.....	.....	.....	.....	.....	12.73	12.42
1922	3.23	3–4	9.31	8–10	.98	11.99	7–8	12.97	8–10	33.98	26.00 / 32.80
1838	3.93	3.	.....	.....	3.91	13.07	10	16.98	16	29.82	24.60
1761	2.83	2.	9.38	10.	2.45	6.51	5.	8.96	7½	27.15	23.50
1831	9.77	10.	.....	.....	.....	.....	.....	8.62	.....	34.48	30.00
2109	2.35	2–2½	2.30	2–2½	3.09	8.44	8–9	11.53	22–25*	21.33	18.80 / 22.30
2086	.59	½–¾	1.87	1–2	1.66	8.31	7–10	9.97	18–25*	14.61	12.40 / 18.35
2087	1.31	1½–2½	1.33	1–2	2.54	10.42	8–11	12.96	26–32*	19.28	16.30 / 24.50
2092	2.86	2.90	2.00	2	2.92	9.57	8	12.49	9¾	23.81	21.35
1954	.....	.....	1.54	2–3	1.38	13.06	11–13	14.44	.....	15.40	13.00 / 16.00
1957	1.53	1–2	1.09	1–2	1.74	10.86	10–12	12.60	11–14	19.75	16.60 / 23.60
1955	.....	.....	.....	.....	.72	15.20	14–16	15.92	.....	15.20	14.00 / 16.00
1956	3.57	4¼–5	3.96	5–6	1.50	10.06	8–10	11.56	9–12	28.22	27.95 / 34.20
1958	2.42	2¼–3	8.17	8–9	1.52	9.06	8–10	10.58	9–12	27.25	25.70 / 31.20
1777	2.96	3.67	.....	.....	3.38	12.79	12.30	16.17	.....	26.26	25.77
1776	6.36	4.92	.....	.....	.....	.....	.....	19.63	25.20	26.86	.....
2073	2.51	2½–3½	1.90	2½–3½	1.99	9.98	9–11	11.97	.....	22.60	20.80 / 27.20

†Sulphate Potash; divide by 1.85 to reduce to Potash.
*Bone Phosphate; divided by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1985	Chemical Co., of Canton, Baltimore, Md.	Pure Dissolved S. C. Bone	New Windsor
1851	Chesapeake Guano Co., Baltimore, Md.	Chesapeake Guano for all Crops	Baltimore
1879	" " "	Potato Grower—Special Truck Guano	Baltimore
1960	R. L. Christie & Co., Baltimore, Md.	Corn and Oats Special	Colora
1962	" " " "	Early Potato Grower	Colora
1959	" " " "	Farmers' Famous Bone Phosphate	Colora
1963	" " " "	Special Potato and Vegetable Fertilizer	Colora
961	" " " "	Sure Crop Ammoniated Phosphate	Colora
1964	" " " "	Unexcelled Acid Phosphate	Colora
1965	" " " "	Wheat and Grass Special	Colora
2071	Claremont Abatoir Co., Baltimore, Md.	Pure Ground Bones	Baltimore
1950	E. A. Clendennin & Bro., Colora, Md.	Farmers' Favorite Vegetator	Colora
1952	" " "	High Grade Acid Phosphate	Colora
1924	" " "	National Standard Ammoniated Phosphate	Elkton
1949	" " "	Potato and Tobacco Phosphate	Colora
1953	" " "	Pure Dissolved Bone	Colora
1948	" " "	Pure Ground Bone	Colora
1951	" " "	Soluble Bone Phosphate	Colora
1925	" " "	Special Tobacco and Truck	Elkton
1919	James Clogg, Pocomoke.	Dried Fish	Pocomoke
1929	J. A. Cranston Co., Newport, Del.	Bone Meal	North East
2007	Crocker Fertilizer & Chemical Co., Buffalo, N. Y.	New Rival Ammoniated Superphosphate	Walkersville

Maryland Agricultural College, February to July, 1895, Continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1985	.....	.....	.....	.....	1.58	14.02	14–16	15.60	.....	$14.02	$14.00 16.00
1851	2.35	2½	1.53	1	2.26	10.42	9.	12.68	.....	22.44	19.30
1879	3.98	3½	4.81	5	1.84	7.26	7.	9.10	.....	26.56	23.90
1960	2.40	2–3	2.16	2–3	1.37	9.84	10–12	11.21	13.16	22.01	21.80 28.80
1962	4.01	4–5	3.18	2–3	3.14	8.03	7–9	11.17	8–11	26.73	23.00 30.00
1959	.89	1–2	2.74	2–3	.66	9.58	10–13	10.24	12–16	17.31	18.20 26.40
1963	2.53	2½–3½	3.16	3–4	1.79	9.54	10–12	11.33	13–16	23.27	24.30 31.30
1961	1.50	1–2	3.24	3–4	1.14	9.52	8–11	10.66	10–14	19.84	16.80 25.00
1964	....	.....	.....	.....	2.16	14.00	13–16	16.10	15–19	14.00	13.00 16.00
1965	2.26	2–3	2.00	2–3	1.53	9.73	10–12	11.26	13–16	21.38	21.80 28.80
2071	5.31	4½	...	.....	.....	....	.....	21.73	46*	28.64	.....
1950	1.37	1–1½	1.74	1–2†	1.53	10.71	6–8	12.24	7–10	19.62	11.80 17.30
1952	.....	.....	.....	.....	.50	14.54	13–16	15.04	.....	14.54	13.00 16.00
1924	1.91	1½–2½	1.73	1½–2½	2.86	10.76	10–12	13.62	13–17	22.09	19.80 27.40
1949	1.17	1–2	4.61	9–11†	1.38	8.30	6–8	9.68	.....	18.91	15.20 21.60
1953	2.53	2–3	.....	.....	2.54	11.41	14–15	13.95	33–39*	22.80	23.40 28.20
1948	4.93	4–5	..	.....	.....	.....	.....	23.99	48–55*	28.30	.....
1951	.....	.....	1.82	2–3	.69	11.62	8–12	12.31	9–14	13.72	10.40 15.80
1925	2.24	3–4	4.55	6–8	.43	5.44	6–8	5.87	.....	17.99	22.20 29.60
1919	10.81	.....	...	.....	.....	.....	.....	9.44	... ..	38.09	.....
1929	4.69	4–5	....	.....	.....	.....	.....	21.68	40–50*	26.91	.....
2007	1.62	1½–2½	1.75	1–3	2.52	9.99	10–13	12.51	22–25*	20.11	18.10 27.90

*Bone Phosphate; divided by 2.18 to reduce to Phosphoric Acid.
†Sulphate Potash; divide by 1.85 to reduce to Potash.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
2009	Crocker Fertilizer & Chemical Co., Buffalo, N. Y.	Niagara Phosphate	Walkersville
2006	" " "	Potato, Hop and Tobacco Phosphate	Walkersville
2008	" " "	Special Potato Manure	Walkersville
1974	Wm. Davison & Co., Baltimore, Md.	"Boss" Ammoniated Superphosphate	Bel Air
1754	" " " "	Dissolved S. C. Bone	Baltimore
1975	" " " "	High Grade Ammoniated Superphosphate	Bel Air
1973	" " " "	Pen-Mar Ammoniated Bone Phosphate	Bel Air
1818	L. E. P. Dennis & Son., Crisfield, Md.	Fish and Potash Mixture No. 1	Crisfield
1817	" " "	Seven Per Cent Potato and Pea Mixture	Crisfield
1854	Detrick Fertilizer & Chemical Co., Baltimore, Md.	Ammoniated Bone	Baltimore
1853	" " "	Dissolved Bone	Baltimore
2125	" " "	Dissolved S. C. Bone	Baltimore
1766	" " "	Excelsior Compound	Baltimore
2038	" " "	Farmers' New Method Phosphate	Silver Spring
2036	" " "	Mason's No. 4	Silver Spring
2091	" " "	Orient Guano	Baltimore
2037	" " "	Potato Fertilizer	Silver Spring
2117	" " "	Sea Fowl Guano	Baltimore
1690	" " "	Tobacco Plant Bed Fertilizer	Baltimore
2039	" " "	Vegetable Compound	Silver Spring
2113	Dudley & Carpenter, Baltimore, Md.	Ammoniated Bone Phosphate	Baltimore
1809	" " " "	California Tobacco Compound	Baltimore

Maryland Agricultural College, February to July, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Camparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
2009	.....	.....	.. .	.....	2.32	11.75	11½–13	14.07	12½–16	$11.75	$11.50 13.00
2006	2.41	2½–3½	3.27	6†	1.18	10.31	10–12	11.49	11–14	23.58	24.00 30.00
2008	4.80	4½	5.97	5.40	2.02	8.21	8	10.23	9	31.43	29.10
1974	2.60	2½	2.76	2½	5.33	9.00	8	14.33	11	24.56	21.40
1754	.....	.....	.....	.....	2.85	13.96	13	16.81	16	13.96	13.00
1975	2.74	2¾	2.60	2¾	4.45	11.07	10	15.52	13	26.77	24.80
1973	1.68	1.40	2.85	2½	4.05	8.07	8	12.12	10	20.00	17.50
1818	3.99	3½–4½	3.99	3½–4½	1.73	9.12	7–8	10.85	.....	27.94	22.40 27.60
1817	6.37	7	4.70	4	1.02	8.07	7	9.09	.....	34.10	33.40
1854	1.77	1½–2	1.38	1–2	4.10	9.24	9–11	13.34	11–14	20.24	17.50 23.00
1853	2.71	2½	.....	.....	2.61	10.57	10	13.18	12	22.38	20.70
2125	....		....	.....	.90	14.16	14	15.06	15	14.16	14.00
1766	5.33	6	2.38	2	1.74	8.65	7	10.39	9	29.79	29.60
2038	1.94	2½	....	.....	4.05	9.58	8.	13.63	9	19.75	17.70
2036	2.32	2½	1.02	1.	4.38	9.20	9	13.58	.....	21.65	19.30
2091	4.05	4½	3.18	3	2.70	7.50	6	10.20	.....	25.95	23.70
2037	2.26	2½	3.93	4	2.15	10.99	8	13.14	9½	25.19	22.00
2117	2.84	2.90	2.04	2	2.98	9.80	8	12.78	9.75	24.11	21.35
1690	8.90	10	....	.....	1.70	8.27	7	9.97	9	37.64	39.60
2039	6.62	7	4.24	4	1.90	7.11	7	9.01	9	33.77	34.60
2113	3.71	2¾–3	2.10	2–2½	2.25	9.35	10–11	11.60	12–14	25.80	23.45 26.50
1809	4.53	4	2.07	2	.27	10.64	7	10.91	.....	28.59	22.40

†Sulphate Potash; divide by 1.85 to reduce to Potash.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
2118	Dudley & Carpenter, Baltimore, Md.	Dissolved S. C. Rock	Baltimore
1685	" " " "	No. 1, Peruvian Guano	Baltimore
1907	" " " "	Soluble Bone Phosphate.	Baltimore
1686	" " " "	Special Tobacco Plant Guano	Baltimore
1918	" " " "	Special Wheat Mixture	Baltimore
2089	" " " "	Special Wheat Mixture	Baltimore
2005	T. H. Eckenrode, Taneytown, Md.	O. K. Phosphate	Taneytown
1945	Eureka Fertilizer Co., Perryville, Md.	Alkaline Bone and Potash	Rising Sun
1932	" " "	Bone Meal	Leslie
1966	" " "	Corn and Potato Special	Perryville
1947	" " "	Farmers' Favorite Phosphate	Rising Sun
1933	" " "	Imperial Bone Phosphate	Leslie
1946	" " "	P. &. P. Phosphate	Rising Sun
1967	" " "	Potato and Vegetable Fertilizer	Perryman's
1944	" " "	Raw Bone Phosphate	Rising Sun
1787	Excelsior Guano Co., Baltimore, Md.	Excelsior No. 1, Peruvian Guano & Soluble Phos.	Baltimore
1993	Farmers' Fertilizer Co., Westminster, Md,	XX Bone Phosphate	Westminster
1769	Farmers and Planters' Agency, Baltimore, Md.	Ammoniated Bone	Baltimore
1692	" " "	Chandos Guano	Baltimore
1701	" " "	No. 1, Peruvian Guano	Baltimore
1867	W. S. Farmer & Co., Baltimore Md.	B. & P. Fertilizer	Baltimore
1899	" " " "	Clyde Brand	Baltimore

Maryland Agricultural College, February to July, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
2118	....	.. ....	....	.....	.41	15.63	14.	16.04	15	$15.63	$14.00
1685	10.06	10.	1.60	.....	2.93	9.35	.....	12.28	.....	44.76	30.00
1907	2.19	2–2½	1.32	1¼–1½	2.83	8.32	9–10	11.15	.....	19.57	18.05 21.00
1686	8.30	10.	2.89	3†–5	.52	8.68	8	9.20	10	38.53	41.80
1918	.....	.....	3.28	2½†	2.37	12.13	12.	14.50	13½	16.36	15.60
2089	.....	.....	.20	2½†	.24	15.71	12.	15.95	13½	15.71	15.60
2005	1.27	1	2.27	2	.92	8.78	9	9.70	.....	17.17	15.80
1945	.....	.....	2.73	2–3	2.83	10.49	11–13	13.32	12–15	14.35	13.40 16.80
1932	4.46	3–4	.....	.....	.....	.....	.....	24.45	22–25	33.06	.....
1966	1.49	1–2	4.28	3–4	3.79	9.79	9–10	13.58	11–13	22.77	18.00 23.80
1947	1.61	2–3	3.47	2–3	3.89	10.80	10–12	14.69	12–15	23.59	21.20 28.20
1933	1.22	1–2	2.18	1–2	3.04	10.15	9–11	13.19	10–13	19.84	15.40 22.40
1946	.....	.....	...	.....	3.07	12.23	13–15	15.30	15–18	12.23	13.00 15.00
1967	2.15	2–3	2.87	4–6	2.80	11.38	8–10	14.18	10–13	24.66	20.80 28.80
1944	1.92	2–3	2.36	2–4	2.96	10.32	10–12	13.28	13.16	22.28	21.80 29.80
1787	4.94	5–6	2.27	3–5	1.09	7.52	10–12	8.61	.....	26.76	30.00 37.40
1993	1.05	1	3.47	3	.87	10.10	8	10.97	9	19.26	16.20
1769	3.29	3	2.38	2	1.01	9.09	7	10.10	.....	23.77	19.40
1692	9.62	10	2.81	.....	1.46	6.03	....	7.49	.....	39.79	30.00
1701	11.09	10	1.39	.....	3.30	8.87	.....	12.17	.....	47.28	30.00
1867	.....	.....	1.89	2½	1.39	11.60	10	12.99	24*	14.05	12.90
1899	1.14	1	2.52	2½	1.17	10.34	9	11.51	22*	19.05	16.90

†Sulphate of Potash; divide by 1.85 to reduce to Potash.
*Bone Phosphate; divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizers.	Place of Sampling.
1901	W. S. Farmer & Co., Baltimore, Md.	Dissolved Raw Bone	Baltimore
1900	" " " "	Dissolved S. C. Bone	Baltimore
1775	" " " "	Fish Mixture	Baltimore
1864	" " " "	Ground Bone	Baltimore
1724	" " " "	Harvest Queen	Baltimore
1732	" " " "	No. 1 Potato Manure	Baltimore
1862	" " " "	Potato Compound	Baltimore
1711	" " " "	Seven Per Cent Potato Guano	Snow Hill
1733	" " " "	Special Tobacco and Potato	Baltimore
1714	" " " "	Standard Phosphate	Snow Hill
1694	E. B. Freeman & Co., Norfolk, Va.	Pocomoke Superphosphate	Pocomoke
2088	T. H. Gill, Avalon, Va.	Standard Corn and Oats Fertilizer	Baltimore
1996	N. I. Gorsuch & Son, Westminster, Md.	Westminster Dissolved Raw Bone Phosphate	Westminster
1997	" " " "	Westminster No. 3 Bone XXXX	Westminster
1978	Griffith & Boyd, Baltimore, Md.	High Grade Acid Phosphate	Parkton
1979	" " "	Pure Dissolved Animal Bone	Parkton
1783	" " "	Spring Crop Grower	Baltimore
1998	" " "	Valley Fertilizer	Westminster
1778	Griffith, Turner & Co., Baltimore, Md.	Ammoniated Alkaline Plant Food	Baltimore
1781	" " "	Animal Bone Phosphate	Baltimore
1896	" " "	Ground Bone	Baltimore
1883	" " "	High Grade Acid Phosphate	Baltimore

Maryland Agricultural College, February to July, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1901	2.98	2½	.....	.....	.64	13.71	12	14.35	28*	$25.77	$23.70
1900	.....	.....	.....	.....	1.66	14.44	14	16.10	15	14.44	14.00
1775	2.06	2	1.59	1½	1.98	10.61	9	12.59	11	21.69	19.50
1864	3.24	3	.....	.....	.....	.....	.....	17.02	15	22.53	.....
1724	1.66	1½	3.00	2½	1.52	10.05	10	11.57	11½	20.95	19.90
1732	4.22	4½	7.95	7	1.02	8.42	8	9.44	9	31.32	30.70
1862	1.69	1½	2.51	2½	1.58	10.71	10	12.29	11½	21.38	19.90
1711	6.81	7	5.05	5	.74	8.47	7	9.21	8	36.08	35.00
1733	2.86	3	3.27	3	.93	8.09	9	9.02	.....	22.12	22.80
1714	2.88	2.85	2.67	2½	1.69	9.92	10	11.61	11½	24.22	23.95
1694	2.07	2–3	1.59	2–3	1.87	10.92	8–9	12.79	.....	22.02	17.60 ~ 22.80
2088	.75	.31	2.20	2.	1.45	11.93	10	13.38	11½	19.64	15.83
1996	1.22	1.40	1.61	2½	3.49	8.56	7	12.05	8	17.63	15.45
1997	.52	.25	1.63	1½	2.66	9.82	8	12.48	9	16.57	12.45
1978	.....	.....	.....	.....	1.42	12.00	14	13.42	15.	12.00	14.00
1979	2.01	3	.....	.....	2.18	10.48	10	12.66	25*	19.92	21.60
1783	2.58	1½	3.40	4½	1.71	10.32	6½	12.03	16*	24.55	17.40
1998	.89	†	2.27	2	3.31	8.43	8	11.74	9	17.05	12.20
1778	1.89	1	2.31	1½	2.13	7.49	6½	9.62	7½	18.25	12.90
1781	2.46	2½	1.57	1½	2.24	8.39	10	10.63	11	20.36	21.60
1896	4.91	4	.....	.....	.....	.....	.....	22.62	46*	27.46	.....
1883	.....	.....	.....	.....	2.35	12.14	13	14.49	14	12.14	13.00

*Bone Phosphate; divide by 2.18 to reduce to Phosphoric Acid.
†Traces.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
2103	Wm. R. Griffith, Baltimore, Md.	Local Option	Baltimore
2066	" " "	Slaughter House (G) Phosphate	Baltimore
1704	" " "	Trucker (G) Phosphate	Baltimore
2102	" " "	Try It	Baltimore
1815	" " "	Special for Plant Beds	Baltimore
1935	S. M. Hess & Bro., Philadelphia, Pa.	Ground Bone	Leslie
1934	" " " "	Keystone Bone Phosphate	Leslie
1970	J. Horner, Jr., & Co., Baltimore, Md.	Ammoniated Raw Bone Superphosphate	Bel Air
2099	" " " "	Concentrated Maryland Superphosphate	Baltimore
1800	" " " "	Cultivator	Baltimore
1848	" " " "	Dissolved Slaughter House Bone Dust	Baltimore
1796	" " " "	Slaughter House Bone Dust	Baltimore
1846	Dr. I. H. Houston, Vienna, Md.	High Grade Truck Fertilizer	Baltimore
1709	Hubbard & Co., Baltimore, Md.	Columbia Gem	Pocomoke
1707	" " "	Farmers' IXL Superphosphate	Pocomoke
1682	" " "	High Grade Soluble Bone and Potash	Lynches
1916	" " "	High Grade Soluble S. C. Phosphate	Baltimore
1681	" " "	Soluble Bone and Potash	Lynches
1708	" " "	Truckers' 7 per Cent Royal Seal	Pocomoke
2098	" " "	Warranted Pure Raw Bone	Baltimore
1941	M. P. Hubbard & Co., Baltimore, Md.	Ammoniated Bone and Potash	Aberdeen
1758	" " "	Bermuda Guano for Early Truck and Potatoes	Baltimore

Maryland Agricultultural College, February to July, 1895. continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
2103	...	.....	3.07	2½	1.08	10.08	10	11.16	11	$13.58	$12.90
2066	2.16	2	2.40	2¼	1.98	8.52	5	10.50	10½	20.29	17.55
1704	5.01	4½	2.64	2½	1 36	7.34	5	8.70	7½	27.30	23.50
2102	1.30	1.	.85	1.	2.55	7.26	5	9.81	6	14.99	10.60
1815	4.74	4½	2.51	2½	1.33	7.47	5	8.80	5½	26.49	22.30
1935	3.25	3–5	.....	.....	.....	.....	.....	18.01	40–50*	23.09	.....
1934	1.35	1–2	1.26	1–2	1.17	7.75	8–11	9.92	10–14	15.31	14.80 to 23.00
1970	2.09	2½	2.41	2½	2.11	9.53	8	11.64	25*	21.39	22.00
2099	3.86	3½	3.68	6½†	1.69	8.01	13	9.70	30*	25.92	30.00
1800	1.29	2½	2.52	2½	2.30	8.17	7	10.47	9	17.58	19.60
1848	2.55	2½	.....	.....	3.41	12.40	12.	15.81	15	24.58	23.50
1796	6.50	6	.....	.....	.....	.....	.....	20.97	20	32.19	.....
1846	3.30	3	6.59	5	2.02	8.18	7	10.20	15*	27.60	22.40
1709	.76	½	1.57	1½	1.28	9.29	8	10.57	10	15.77	13.80
1707	2.12	2.	2.80	1¾	1.20	8.37	7	9.57	9	19.92	16.55
1682	.....	.....	3.05	3.	.33	13.23	12	13.56	13	16.41	15.40
1916	.....	.....	.....	.....	.91	14.34	14	15.25	.....	14.34	14.00
1681	.....	.....	2.11	2	.66	11.31	10	11.97	11½	13.68	12.60
1708	7.25	7.	3.93	4	1.44	7.73	5	9.17	.....	35.82	31.00
2098	6.66	4	.....	.....	.....	.....	.....	19.72	50*	31.37	
1941	1.46	1–1½	1.87	1½–2	1.92	9.27	8–10	11.19	9½–12	18.53	15.00 to 19.70
1758	6.64	7–7½	3.88	3–3½	1.84	9.09	7–9	10.93	8½–11	35.81	33.30 to 38.00

*Bone Phosphate; divide by 2.18 to reduce to Phosphoric Acid.
†Sulphate of Potash; divide by 1.85 to reduce to Potash.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1737	M. P. Hubbard & Co., Baltimore, Md.	Celebrated Bone Superphosphate	Baltimore
1876	" " "	Farmers' Acme Fertilizer	Baltimore
2121	" " "	High Grade S. C. Phosphate	Baltimore
1841	T. R. Hubbard & Son, Chestertown, Md.	American Standing Bone Superphosphate	Baltimore
1898	" " " "	Extant Bone Superphosphate	Baltimore
1768	" " " "	Imperial Compound Phosphate	Baltimore
1793	" " " "	Peerless Corn and Tomato Phosphate	Baltimore
1823	Rudolph Humphreys, Salisbury, Md.	Our Fish Mixture "F"	Salisbury
1822	" " " "	Our Mixture "B"	Salisbury
2056	C. M. Keedy, Keedysville, Md.	Bone and Blood	Keedysville
2057	" " "	Ground Bone	Keedysville
2107	H. H. & W. E. Klinefelter Havre de Grace, Md.	Ammoniated Bone Phosphate	Baltimore
2105	" " "	Roland Ammoniated Bone Phosphate	Baltimore
2106	" " "	Truckers' Guano	Baltimore
1799	S. L. Lamberd Co., Baltimore, Md.	Boss Fertilizer	Baltimore
1798	" " " "	Favorite Fertilizer	Baltimore
1772	" " " "	Special Potato Grower	Baltimore
2021	Lazarretto Guano Co., Baltimore, Md.	Ammoniated Bone Phosphate	Mt. Airy
1830	" " "	Bone Compound for Wheat Corn and Oats	Pocomoke
2020	" " "	Dissolved S. C. Bone	Mt. Airy
2112	" " "	H. G. Dissolved Bone Phosphate and Potash	Baltimore
1860	" " "	P Dissolved S. C. Bone	Baltimore

Maryland Agricultural College, February to July, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed	Found.	Guaranteed.		
1737	2.60	2½–3	2.38	2–2½	1.46	10.27	9–11	11.73	10½–13	$23.38	$21.20 25.90
1876	2.37	2–2½	2.64	2–2.6	1.71	8.87	7–9	10.58	8½–11	21.42	17.30 22.10
2121	.....	....	.....	.....	3.00	14.05	14–15	17.05	26–30*	14.05	14.00 15.00
1841	2.65	2–3	3.92	3–4	1.99	12.24	8–10	14.23	10–13	27.75	19.80 26.80
1898	2.53	1–2	3.98	2–3	1.98	12.08	8–10	14.06	9–11½	27.26	15.20 21.90
1768	.81	½–1	3.57	2–3	1.02	9.83	9–11	10.85	11–14	18.41	15.50 21.00
1793	.62	.7–1	4.55	4–6	.72	7.30	7–9	8.02	15–17*	15.60	14.50 19.80
1823	2.84	2½	1.25	1.	2.13	9.83	8.	11.96	9	22.85	18.70
1822	3.07	3.	1.93	1½	1.81	9.53	8.	11.34	9	23.67	20.70
2056	3.91	6–6½	.....	.....	13.93	4.17	.....	18.10	30–35*	25.09	26.40 29.10
2057	2.12	3–4	.	.....	.....	.....	.....	25.19	45.–55*	28.47	.....
2107	1.50	1½	2.32	2.	.74	9.80	9.	10.54	.....	19.02	17.30
2105	1.37	1.	2.17	2.	.78	9.11	9.	9.89	.....	17.68	15.80
2106	3.00	3.	3.40	3.	1.51	8.53	10.	10.04	... ...	23.55	24.00
1799	4.01	4.	.91	1.	1.14	7.39	7.	8.53	9.	22.49	22.60
1798	2.30	2.	1.15	1.	1.98	9.83	8.	11.81	9.	21.04	17.20
1772	2.37	1½	4.17	4½	2.02	9.42	7.	11.44	8.	23.79	18.00
2021	1.26	1.	2.37	2.	1.04	8.52	9.	9.57	.....	17.01	15.80
1830	1.39	1¼	2.64	2½	1.41	9.88	10	11.29	.....	19.52	18.25
2020	.....	.....	.14	1	1.50	14.28	10	15.78	.....	14.28	11.00
2112	.....	.....	2.51	3.	.37	11.89	11.	12.26	.....	14.55	14.06
1860	.....	.....	.....	.....	1.68	14.28	14.	15.96	.....	14.28	14.00

*Bone Phosphate; divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1859	Lazarretto Guano Co., Baltimore, Md.	Special Tobacco Fertilizer	Baltimore
2119	" " "	Special Tobacco and Potato	Baltimore
1780	Lister Agr'l Chemical Works, Newark, N. J.	Ammoniated Dissolved Bone	Baltimore
2061	" " "	Animal Bone and Potash	Chewsville
1942	" " "	Celebrated Ground Bone	Aberdeen
1802	" " "	Harvest Queen Phosphate	Baltimore
1913	" " "	Potato Fertilizer, No. 2	Baltimore
1773	" " "	Potato Manure	Baltimore
1750	" " "	Special Potato Fertilizer	Baltimore
1795	" " "	Standard Pure Bone Superphosphate	Baltimore
1684	Joseph Lister, Chicago, Ill.	Pure Bone Meal	Aberdeen
2104	J. H. Livingston, Baltimore, Md.	Champion Fertilizer	Baltimore
2035	P. Mann & Co., Washington, D. C.	Potomac "A" Ammoniated Superphosphate	Silver Spring
2040	" " " "	Raw Bone Meal	Silver Spring
1742	Md. Agricultural Co., Baltimore, Md.	Excello Soluble Phosphate	Baltimore
1746	" " " "	Paragon Phosphate	Baltimore
1912	" " " "	Pure Bone Meal	Baltimore
1914	Md. Commission Agency.	No. 1, Peruvian Guano	Baltimore
2067	Md. Fertilizing Co.	Potato Food	Baltimore
2042	" " "	Linden Superphosphate	Rockville
2068	" " "	Pure Ground Animal Bones	Baltimore
1881	" " "	Sangston's Cereal and Plant Food	Baltimore

Maryland Agricultural College, February to July, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1859	3.19	3.	3.17	3.	.95	8.77	9.	9.72	.....	$23.84	$22.80
2119	3.16	3.	3.28	3.	1.92	8.37	9	10.29	.....	24.13	22.80
1780	2.41	2.20	1.84	2.	2.78	9.36	9	12.14	.....	21.97	19.40
2061	.....	.....	5.42	5–7	1.79	9.13	9–11	10.92	10–12½	15.27	14.40 to 18.60
1942	3.42	3¼	.....	.....	7.52	8.95	12	16.47	26*	25.51	24.25
1802	2.18	1½	2.14	2.	2.69	9.57	9½	12.26	.....	21.77	17.90
1913	2.62	2.20	4.29	4.	1.34	11.13	9¼	12.47	.....	26.31	21.70
1773	4.56	4½	7.01	7.	1.28	8.72	7½	10.00	.....	31.92	29.50
1750	2.08	2.	3.54	3.	2.37	8.75	8.	11.12	9.	21.70	17.20
1795	2.79	2.85	1.81	1½	2.48	10.28	10.	12.76	12.	24.01	23.25
1684	4.23	4.68	....	.....	.....	.....	25.60	24.53	.....	30.13	.....
2104	2.14	1½	1.94	2½	2.11	8.64	7.	10.75	8.	20.00	16.00
2035	2.46	2–3	1.49	1¼–3	2.69	8.11	8–10	10.80	.....	20.22	16.85 to 24.00
2040	4.09	5–6	.....	.....	.....	.....	.....	17.63	46–50*	22.62	.....
1742	2.80	2¾–3	2.74	2½–3	1.39	10.91	10–12	12.30	11½–14	25.06	23.65 to 27.60
1746	1.16	1–2	2.35	2¼–3	.96	9.82	9–11	10.78	10½–13	18.09	16.95 to 23.40
1912	3.84	4–5	..	.....	.....	.....	.....	24.25	20–23	29.77	.....
1914	10.34	10.	1.32	.....	5.36	5.18	.....	10.54	.....	41.78	30.00
2067	2.32	2¼	10.81	10	2.05	8.14	6.	10.19	7½	30.69	24.35
2042	.....	.....	1.86	2.	2.88	10.57	9.	13.45	.....	13.58	11.00
2068	4.66	4.	.....	.....	..	.....	.....	24.33	21	28.70	.....
1881	1.76	1¼	1.85	2.	3.32	9.73	10	13.05	.....	20.80	17.75

*Bone Phosphate; divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1915	Md. Fertilizing Co., Baltimore, Md.	Vegetable Compound	Baltimore
2110	Md. Grange Agency, Baltimore, Md.	Corn and Potato Phosphate	Baltimore
1747	" " " "	Dissolved S. C. Bone	Baltimore
1702	" " " "	Genuine Lobos Peruvian Guano	Baltimore
1856	Miller Fertilizer Co., Baltimore, Md.	Dissolved S. C. Bone	Baltimore
1897	" " " "	Ground Bone	Baltimore
1804	" " " "	Harvest Queen Phosphate	Baltimore
1803	" " " "	No. 1 Pototo Phosphate	Baltimore
1872	" " " "	No. 2 Potato Fertilizer	Baltimore
1712	" " " "	Pure Bone Meal	Snow Hill
1713	" " " "	Special Potato Fertilizer	Snow Hill
1741	" " " "	Standard Superphosphate	Baltimore
1814	W. H. Moore & Co. Baltimore, Md.	Special for Tobacco Beds	Baltimore
1790	Mt. Airy Manufacturing Co., Baltimore, Md.	Guano for Potatoes	Baltimore
1767	" " "	Insula Guano for Corn and Oats	Baltimore
1863	" " "	Piedmont Potato Producer	Baltimore
1785	" " "	Piedmont Pure Raw Bone Mixture	Baltimore
1816	" " "	Piedmont Special for Tobacco Beds	Baltimore
1788	" " "	Ten Per Cent. Piedmont Guano for Truck	Baltimore
1980	Geo. R. Mowell, Glencoe, Md.	Dissolved S. C. Bone	Glencoe
1981	" " "	Standard Bone Phosphate	Glencoe

Maryland Agricultural College, February to July, 1895, Continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1915	8.24	8.	4.58	4.	.32	7.86	7.	8.18	10	$38.92	$38.20
2110	1.38	1–2	2.40	2¾–3	2.16	9.11	9–11	11.27	21.83–28.38	18.53	16.65 23.40
1747	.....	.....	.....	.....	1.01	14.28	14–16	15.29	30–32*	14.28	14.00 16.00
1702	6.09	6.	1.78	.....	4.80	10.25	.....	15.05	.....	35.23	18.00
1856	.....	.....	.....	.....	1.05	14.22	16.	15.27	32*	14.22	16.00
1897	3.13	3–4	.....	.....	.....	.....	.....	16.08	15–17	21.66	.....
1804	1.37	1¼–2	2.21	2¼–3	1.36	10.67	10–12	12.03	25.10–30.50*	19.94	18.90 24.90
1803	3.10	4½–5	7.31	7–8	.66	9.75	8–10	10.41	9–12	28.71	30.70 36.20
1872	2.13	2–3	4.07	4–5	1.26	8.83	8–10	10.09	9–12	21.82	20.20 28.20
1712	4.83	4–5	....	.....	.....	.....	.....	22.24	20–23	31.50	.....
1713	1.17	1–2	5.25	5–6	1.30	7.86	7–9	9.16	19.65–26.19*	18.97	17.60 27.60
1741	2.90	2.85–3.25	2.44	2½–3	1.41	10.61	10–12	12.02	25.10–31.65*	24.72	23.95 28.65
1814	6.24	7.	2.13	2.	.56	6.86	5.	7.42	.....	29.42	29.00
1790	6.36	6.	3.21	9.	.77	7.12	5.	7.89	.....	31.30	33.00
1767	.85	½	2.10	2.	.93	6.32	5.	7.25	7.	12.79	10.70
1863	3.31	3–4	5.75	6–7	.72	6.01	5–6	6.73	7–9	23.32	22.20 28.00
1785	1.04	1–2	1.06	1–2	2.08	8.47	7–9	10.55	11–14	15.59	14.80 21.80
1816	7.37	7.	2.64	2.	.56	6.40	5.	6.96	.....	32.77	29.00
1788	8.49	10.	3.47	3.	.86	5.89	5.	6.75	6.	36.53	39.60
1980	.....	.....	.....	.....	1.63	11.51	14	13.14	15	11.51	14.00
1981	2.51	2½	2.32	1½	2.14	10.23	9.	12.37	10.	23.74	20.40

*Bone Phosphate: divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1797	J. B. Nichols & Son, Baltimore, Md.	Farmers' Friend Guano	Baltimore
1718	Nickerson Fertilizer Co., Easton, Md.	Bone and Potash	Berlin.
2064	" " " "	Corn Guano	Baltimore
1722	" " " "	High Grade Vegetable Compound	Easton
1905	" " " "	S. C. Phosphate and Potash	Baltimore
1720	" " " "	Special Tobacco Bed Mixture	Easton
1719	" " " "	Truck Guano	Berlin
2047	North-Western Fertilizer Co. Chicago, Ill.	Horse Shoe Brand Ammoniated Dis. Bone	Gaithersburg
1870	" " " "	Horse Shoe Brand Corn and Tomato Grower	Baltimore
1871	" " " "	Fine Raw Bone	Baltimore
1887	" " " "	Horseshoe Brand Prairie Phosphate	Baltimore
1888	" " " "	Horseshoe Brand Ralston Bone Meal	Baltimore
2115	G. Ober & Sons' Co., Baltimore, Md.	Avondale Ammoniated Dissolved Bone	Baltimore
1725	" " " "	Dissolved Animal Bone	Baltimore
1756	" " " "	Dissolved Bone Phosphate	Baltimore
1779	" " " "	Farmers' Standard Ammoniated Phosphate	Baltimore
1740	" " " "	Special Ammoniated Dissolved Bone	Baltimore
2097	" " " "	Special Compound for Tobacco	Baltimore
1716	Patapsco Guano Co., Baltimore, Md.	Ammoniated Corn Fertilizer	Snow Hill
1710	" " " "	Baltimore Soluble Phosphate	Snow Hill
1715	" " " "	Coon Brand Guano	Snow Hill
1801	" " " "	The Early Trucker	Baltimore

Maryland Agricultural College, February to July, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1797	3.29	3½	6.40	5½	.66	8.76	10.	9.42	.....	$27.18	$28.60
1718	.52	¼–1	.86	3–5	3.29	13.88	10–11	17.17	.....	21.05	15.75 to 21.20
2064	1.14	1–2	1.59	3–4	4.14	10.49	7–9	14.63	8–11	20.08	15.00 to 22.00
1722	1.99	4–5	3.95	6–7	2.30	8.85	6–8	11.15	7–10	21.92	25.80 to 32.80
1905	.....	.....	4.90	3–4	2.29	9.28	9–11	11.57	11–14	15.10	12.80 to 16.20
1720	1.73	3–4	5.26	1–2	1.07	8.84	8–10	9.91	.....	21.71	19.60 to 26.00
1719	1.78	2½–3	3.50	2	1.75	9.95	10–12	11.70	12–15	21.83	22.70 to 27.20
2047	2.79	2½–3½	1.04	.54–1.08	4.21	8.41	8–9	12.62	12–13½	22.19	20.04 to 25.08
1870	2.86	2½	1.13	.54	3.47	8.17	8	11.64	.....	21.60	17.64
1871	5.31	4–5	.....	.....	.....	.....	.....	22.85	22–24	30.49	.....
1887	2.17	2–2½	.....	.....	4.21	7.54	6–8	11.75	9–12	18.09	15.00 to 19.50
1888	5.06	3–4	.....	.....	.....	.....	.....	19.36	13–18	25.70	
2115	2.62	2¼	1.90	1½	1.87	9.24	8½	11.11	11¼	21.97	21.10
1725	3.09	2½	.....	.....	1.98	11.00	10.	12.98	12.	23.66	20.70
1756	.....	.....	.....	.....	1.38	15.65	14.	17.03	16½	15.65	14.00
1779	2.53	2	1.97	1½	2.82	8.75	8	11.57	10½	21.75	19.10
1740	2.30	1½	2.69	1½	1.07	10.37	8.	11.44	10½	22.67	17.10
2097	3.26	2½	2.48	2.	1.38	10.74	8.	12.12	10.	25.98	20.30
1716	1.86	1½	2.38	1½	1.57	9.79	9.	11.36	11	20.65	18.00
1710	.....	.....	1.89	1½	1.26	11.55	10.	12.81	12.	13.94	12.30
1715	1.20	1.	3.01	3.	1.57	9.41	8.	10.98	.....	18.84	15.60
1801	5.21	5.	4.11	4.	1.55	8.43	7.	9.98	.....	30.79	27.40

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1721	Patapsco Guano Co, Baltimore, Md.	Pure Dissolved S. C. Bone	Hillsboro
2069	" " " "	Tobacco Fertilizer	Baltimore
2123	Wm. A. Pleasants, Baltimore, Md.	Fish Compound	Baltimore
2100	" " " "	Mixture No. 2, for Corn and Oats	Baltimore
2116	" " " "	Peruvian and Bone Compound	Baltimore
1875	" " " "	Pure Bone Meal	Baltimore
1972	R. H. Pollock, Baltimore.	Ammoniated Bone Phosphate	Bel Air
1921	" "	Dissolved S. C. Bone	Butler
1971	" "	Ground Animal Bone	Bel Air
1927	" "	Special Corn and Tomato Fertilizer	Rising Sun
1771	" "	Special Potato and Tobacco	Baltimore
1877	Powell Fertilizer & Chemical Co., Baltimore, Md.	Ammoniated Potato Fertilizer	Baltimore
1729	" " "	Dissolved S. C. Bone	Baltimore
2062	" " "	Dissolved S. C. Bone	College
1748	" " "	Green Bag for Potatoes	Baltimore
1903	" " "	Green Bag for Strawberries	Baltimore
1852	" " "	Hard Times Fertilizer	Baltimore
1917	" " "	Potato Producer	Baltimore
1902	" " "	Potato Producer	Baltimore
2065	" " "	Red Bag Fertilizer	Baltimore
1847	" " "	Special Mixture	Baltimore
1845	" " "	Spring Crop Producer	Baltimore

Maryland Agricultural College, February to July, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1721	.....	.....	.....	.....	.83	14.50	13.	15.33	.....	$14.50	$13.00
2069	3.24	3.	3.03	3.	1.86	9.15	9.	11.01	12.	24.85	24.60
2123	2.12	2–3	3.84	3–4	3.12	9.04	6–7	12.16	10–12	22.92	18.60 to 24.40
2100	1.13	1–2	1.61	2–3	3.02	10.52	10–12	13.54	.....	19.43	17.00 to 23.40
2116	4.60	4–5	6.99	6–7	1.54	8.82	6–8	10.36	10–12	32.63	27.60 to 33.40
1875	4.84	4.	.....	.....	.....	.....	.....	21.89	48*	31.97	.....
1972	2.36	2.	2.21	2.	1.34	10.05	10.	11.39	11.	22.15	20.60
1921	.....	.....	.....	.....	1.38	15.85	14.	17.23	15.	15.85	14.00
1971	3.63	4.	.....	.....	.....	.....	.....	26.18	22	32.45	.....
1927	1.65	1.	2.67	2.	1.50	9.95	9.	11.45	10	20.46	16.40
1771	2.75	2½	3.20	3.	1.09	9.04	10.	10.13	11.	22.95	23.10
1877	9.39	10.	4.24	5.	1.42	6.01	6.	7.43	.....	40.47	42.20
1729	.....	.....	.....	.....	1.04	13.94	13½–15	14.98	15½–17½	13.94	13.50 to 15.00
2062	.....	.....	.....	.....	3.81	13.64	13–15	17.45	14–16	13.64	13.00 to 15.00
1748	4.40	6	9.63	8	1.46	6.11	5.	7.57	.....	31.04	32.00
1903	3.00	.....	4.98	.....	2.51	6.27	.....	8.78	.....	23.02	.....
1852	1.19	1.65	2.43	2½	2.20	6.71	7–8	9.01	8–10	15.43	16.45 to 18.25
1917	2.33	2.	2.54	2.	2.40	7.07	8.	9.47	.....	19.45	17.60
1902	1.61	2	3.79	3.	1.46	7.47	7.	8.93	.....	19.46	17.40
2065	3.13	2–3	2.13	2–3	3.04	6.24	8–10	9.88	.....	21.19	17.60 to 24.00
1847	2.27	2½	6.64	8¾	1.78	5.80	6½	7.58	.....	22.01	24.05
1845	1.28	1½	2.23	2½	2.55	6.95	7–8	9.50	8–10	15.94	16.00 to 17.80

*Bone Phosphate; divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1878	Powell Fertilizer & Chemical Co., Baltmore, Md.	Truck Guano	Baltimore
2013	Ramsburg Fertilizer Co., Frederick, Md.	Ammoniated Bone	Mt. Airy
2019	" " "	Corn and Potato Fertilizer	Mt. Airy
2045	" " "	Corn and Potato Fertilizer	Rockville
2043	" " "	Dissolved Animal Bone	Rockville
2011	" " "	Dissolved Bone Superphosphate	Mt. Airy
2044	" " "	Excelsior Plant Food	Rockville
2012	" " "	Excelsior Plant Food Tobacco	Mt. Airy
2026	Rasin Fertilizer Co., Baltimore, Md.	Ammoniated Alkaline Phosphate	Sykesville
2027	" " " "	Bone and Potash	Sykesville
1749	" " " "	Dissolved Bone	Baltimore
1882	" " " "	Pure Dissolved S. C. Bone	Baltimore
2120	" " " "	Special Tobacco Plant Bed Guano	Baltimore
2122	" " " "	Special Tobacco Plant Guano	Baltimore
1977	Henry Reckord Manufacturing Co., Bel Air, Md.	Animal Bone Phosphate	Bel Air
1911	" " " "	Dissolved S. C. Rock	Baltimore
1976	" " " "	Raw Bone	Bel Air
1910	" " " "	Special Compound	Baltimore
2034	John S. Reese & Co., Baltimore, Md.	Challenge Crop Grower	Jessups
2101	" " " "	Half-and-Half	Baltimore
1868	" " " "	May Flower	Baltimore
2033	" " " "	May Flower	Jessups

Maryland Agricultural College, February to July, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1878	2.57	.....	3.59	3.	2.05	5.93	6.	7.98	.....	$19.65	$.....
2013	1.22	1–2	1.95	1–2	3.85	7.35	10–12	11.70	13–16	17.34	15.60 to 21.60
2019	.95	1	2.28	2.	3.25	7.37	8.	10.62	10.	15.92	15.80
2045	1.37	1	2.10	2*	5.46	6.12	8	11.58	12	16.79	15.80
2043	2.11	2–3	.....	.....	4.38	12.09	10–12	16.47	14–17	23.47	20.40 to 26.40
2011	....	.....	.....	.....	2.21	13.36	13.16	15.57	15.16	13.36	13.16
2044	2.41	2–3	.95	1.	4.34	9.51	9–10	13.85	11–13	22.19	19.00 to 23.80
2012	2.11	2–3	2.10	1	3.91	8.26	9–10	12.17	11–13	20.69	19.00 to 23.80
2026	2.32	.....	1.26	1¼	2.40	8.19	8.	10.59	9	19.47	.....
2027	.....	.....	2.10	1¼	1.66	11.93	12.	13.59	13.	14.69	13.65
1749	3.43	2	.....	.....	1.09	10.41	10.	11.50	12	23.43	19.20
1882	.....	.20	....	.....	.58	14.59	14.	15.17	15.½	14.59	14.00
2120	4.03	4.	1.89	2.	.73	10.34	7.	11.07	8.	26.83	23.00
2122	3.94	4.	1.83	2.	.61	10.44	7.	11.05	8	26.57	23.00
1977	1.23	1	1.78	1½	1.54	10.56	8	12.10	12.	19.06	16.50
1911	.....	.....	.....	.....	1.71	14.30	12–15	16.01	.....	14.30	12.00 to 15.00
1976	4.86	4.03	.....	.....	.....	.....	.....	20.85	20.01	24.69	.....
1910	2.32	2.03	2.11	2.13	1.40	9.45	10.66	10.85	13.18	21.25	22.46
2034	2.46	1.	2.98	2.	1.17	8.01	8½	9.18	11¼	20.67	16.85
2101	1.36	1.	.64	.60	1.01	13.42	11.	14.43	28.80*	21.43	18.60
1868	2.32	2¼–3	2.00	2¼–3	1.15	10.57	8½–10	11.72	10–13	22.33	20.10 to 25.80
2033	2.42	2¼–3	2.15	2¼–3	1.26	10.58	8½–10	11.84	10–13	22.87	20.10 to 25.80

*Bone Phosphate; divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
2032	John S. Reese & Co., Baltimore, Md.	Potato Special Manure	Jessups
2114	H. S. Roberts & Co., Westminster, Md.	Big Gun	Baltimore
2002	" " " "	Dissolved S. C. Bone	Westminster
2001	" " " "	Governor	Westminster
2004	" " " "	King	Westminster
2000	" " " "	Special Potato Manure	Westminster
1999	" " " "	Vine and Vegetable Compound	Westminster
2085	Scientific Fertilizer Co., Pittsburg, Pa.	Scientific Corn Fertilizer	Baltimore
1938	Scott Fertilizer Co., Elkton, Md.	Ground Raw Bone, Guaranteed Pure	Aberdeen
1926	" " " "	Pure Dissolved Animal Bone	Elkton
1931	" " " "	Pure Ground Bone	North East
1909	" " " "	Standard Phosphate	Baltimore
1866	" " " "	Sure Growth Compound	Baltimore
1908	" " " "	Sure Growth Superphosphate	Baltimore
1940	Sharpless & Carpenter, Philadelpeia, Pa.	Dissolved Bone Phosphate	Aberdeen
1939	" " "	Gilt Edge Potato Manure	Aberdeen
1891	G. W. Sharretts & Co., Baltimore, Md	Fish, Rock and Potash	Baltimore
1893	" " "	Potato Fertilizer	Baltimore
1880	" " "	Wheat and Grass Fertilizer	Baltimore
2052	J. D. Simmons, Hagerstown, Md.	Excelsior Fruit Producer	Hagerstown
2051	" " "	Wheat and Clover Producer	Hagerstown
1700	W. D. Skinner & Co., Baltimore, Md.	No. 1 Peruvian Guano	Baltimore

Maryland Agriculture College, February to July, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
2032	3.78	3½-4½	6.94	7½-9½	2.00	7.17	6-8	9.17	7-10	$28.08	$25.80 33.80
2114	2.24	2-3	2.04	2-3	1.29	9.97	10-12	10.96	20-25*	21.13	20.00 26.40
2002	.....	.. ...	.....	.....	1.74	13.88	13.	15.62	15.	13.88	13.00
2001	1.51	1½-2	2.68	2½-3½	2.29	9.27	9-11	11.56	20-25*	19.70	17.80 22.70
2004	1.58	1½	2.49	2½	2.29	9.26	9.	11.55	22*	19.71	19.00
2000	2.58	2½-3½	6.46	6-8	1.97	7.61	8-10	9.58	9-11	24.51	23.70 31.10
1999	6.08	6-8	8.16	8-10	3.30	5.96	8-10	9.26	.....	36.00	35.60 46.00
2085	5.01	4½-5½	3.59	4-5	3.20	8.79	8-10	11.99	11-12	31.09	28.30 34.70
1938	4.39	4-5	....	.....	.....	....	.....	23.80	49-54*	28.07	.....
1226	2.77	2½	....	.....	2.93	12.49	13.	15.42	16.*	25.05	24.90
1931	4.49	4-5	....	.....	.....	....	.....	23.31	48-54	28.04	.....
1909	1.26	1½	1.65	2.	3.46	8.08	8	11.54	.....	17.21	16.10
1866	4.15	4½-5½	7.56	7-8	2.51	8.83	8-10	11.34	.....	32.09	30.10 36.50
1908	2.04	2-3	2.04	2-3	2.88	9.97	9-11	12.85	11-14	21.85	20.00 27.00
1940	2.06	2.	2.20	2.	1.58	9.76	6.	11.34	17*	21.04	16.40
1939	3.30	3.	6.36	5.	1.49	8.49	6.	9.98	12*	27.36	21.20
1891	.50	¼-⅝	.54	½-1	1.57	6.38	5-7	7.95	6-9	10.64	7.85 13.35
1893	1.04	1-2	2.03	2-3	1.36	6.14	6-8	7.50	7-10	13.35	12.80 19.80
1880	1.04	1-2	1.33	1-2	1.39	6.28	5-8	7.67	.....	12.82	10.00 17.60
2052	1.45	1.	6.76	6.	2.67	6.65	6.	9.32	.....	20.69	16.20
2051	1.89	2.	7.21	6.	6.86	7.24	12.	14.10	.....	25.92	23.40
1700	9.97	10.	1.48	.....	4.18	8.78	.....	12.96	.....	44.44	30.00

*Bone Phosphate: Divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1691	Slingluff & Co., Baltimore, Md.	Agency's Favorite H. O. D.	Baltimore
1987	" " "	Corn and Oats Fertilizer	New Windsor
1989	" " "	Dissolved S. C. Bone	New Windsor
2090	" " "	Dorsey's No. 1 Tobacco Food	Baltimore
1693	" " "	Dorsey's Tobacco Bed Fertilizer	Baltimore
1988	" " "	McAfee's Potato Grower	New Windsor
1789	" " "	Tobacco Bed Fertilizer	Baltimore
1731	" " "	Truckers' Favorite	Baltimore
1990	" " "	Universal Guano	New Windsor
2055	Standard Soft Phos. Mining Co., Alexandria, Va.	Florida Plant Food	Hagerstown
2095	" " "	Soft Florida Phosphate	Bridewell
2060	J. W. Stonebraker & Son, Hagerstown, Md.	Dissolved Bone Phosphate	Hagerstown
2058	" " " "	Dissolved S. C. Bone	Hagerstown
2059	" " " "	Standard Dissolved Bone	Hagerstown
2074	Susquehanna Fertilizer Co., Baltimore, Md.	Ammoniated Bone Phosphate	Baltimore
2076	" " "	Fine Ground Bone	Baltimore
2082	" " "	Potato Phosphate	Baltimore
2080	" " "	Pure Bone Phosphate	Baltimore
2078	" " "	Pure Dissolved Bone	Baltimore
2075	" " "	Pure Ground Bone	Baltimore
2079	" " "	Soluble Bone Phosphate	Baltimore
1873	" " "	Superior Rock Phosphate	Baltimore

Maryland Agricultural College, February to July, 1895, Continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1691	2.67	.....	2.40	.....	2.94	10.37	.....	13.31	.....	24.61	.....
1987	.....	.....	2.66	2½–3	.50	12.81	13–15	13.31	.....	$15.67	$15.50 18.00
1989	.....	.....	.....	.....	.70	14.81	14.	15.51	.....	14.81	14.00
2090	6.10	6–7	3.52	3–4†	2.69	7.90	13–15*	10.59	....	32.91	26.69 31.32
1693	10.40	10.	2.91	2½	.98	6.50	4.	7.48	.....	42.50	37.30
1988	1.54	1½–2	4.18	4–5	1.42	11.41	9–11	12.83	.....	23.34	19.30 24.20
1789	10.04	10.	2.92	2½	1.15	6.16	4	7.31	.....	41.12	37.30
1731	3.62	3¾–4	3.36	3–4	.87	11.98	9–10	12.85	.....	29.12	25.05 28.00
1990	1.21	1	2.35	2	1.71	10.10	9.	11.81	.....	19.13	15.80
2055	.....	.....	.06	⅛–¼	19.82	1.68	23.–30	21.50	50–60*	9.95	9.32 12.25
2095	....	.....	....	.....	20.29	1.34	24.	21.63	.....	9.73	9.60
2060	.85	1.	2.14	2.	1.63	9.95	9.	11.58	12.	17.60	17.60
2058	.....	.....	.....	.....	1.22	13.86	13.	15.08	14½	13.86	13.00
2059	1.66	2	.....	.....	2.18	10.17	10.	12.35	14.	18.49	20.40
2074	1.82	1½–2½	1.62	1½–2½	2.88	10.82	9–11	13.70	11–16	21.79	18.00 26.20
2076	4.22	3–4	.....	.....	.....	.....	.....	21.27	18–20	26.79	.....
2082	1.81	2–3	3.23	2–3	1.94	11.20	10–12	13.14	12–15	23.26	21.20 28.20
2080	2.22	2–3	1.37	1½–2½	6.35	10.99	9–12	17.34	11–17	25.03	19.50 28.90
2078	2.58	2–3	.....	.....	6.05	11.66	15–18	17.71	32.–35*	25.36	24.00 30.60
2075	4.93	4–5	.....	.....	.....	.....	.....	22.31	20–22	27.80	.....
2079	.....	.....	.....	.....	1.23	14.85	13–15	16.08	14–17	14.85	13.00 15.00
1873	.....	.....	.....	.....	1.52	14.15	13–15	15.67	14–17	14.15	13.00 15.00

†Sulphate Potash: divide by 1.85 to reduce to Potash.
*Bone Phosphate: divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
2077	Susquehanna Fertilizer Co., Baltimore, Md.	Susquehanna Bone Phosphate	Baltimore
2081	" " "	XXV Phosphate	Baltimore
2070	H. S. Taveau & Co., Baltimore, Md.	Allerton Guano	Baltimore
1755	" " " "	Special Compound, No. 1.	Baltimore
2072	" " " "	Special Compound, No. 2.	Baltimore
1865	I. P. Thomas & Sons Co., Philadelphia, Pa.	Fish Guano	Baltimore
1858	" " " "	Normal Bone Phosphate	Baltimore
1861	" " " "	Potato Manure	Baltimore
1840	" " " "	Tip-Top Raw Bone Superphosphate	Baltimore
1689	Wm. B. Tilghman Co., Salisbury, Md.	Fish Fertilizer	Salisbury
1688	" " "	Irish "P"	Salisbury
1821	" " "	Irish "P" Manure	Salisbury
1687	" " "	Mixture "B"	Salisbury
1819	" " "	Our Mixture "B"	Salisbury
1811	Walter Todd, Baltimore, Md.	No. 1, Standard Bone Phosphate for Truck	Baltimore
1890	" " "	No. 1, Standard Bone Phosphate for Wheat	Baltimore
1698	Tolly & Deal, Baltimore, Md.	No. 1, Peruvian Guano	Baltimore
1820	E. S. Truitt, Salisbury, Md.	Fish Mixture XX	Salisbury
2025	Tygert-Allen Fertilizer Co., Philadelphia, Pa.	Allen's Soluble Bone and Potash	Monrovia
1824	" " "	Ammoniated Bone Phosphate	Pocomoke
1825	" " "	Gold Edge Potato Guano	Pocomoke
1826	" " "	High Grade Soluble S. C. Bone	Pocomoke

Maryland Agricultural College, February to July, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
2077	1.94	2–3	1.97	1½–2½	3.44	10.44	9–12	13.88	11–17	$22.38	$19.50 28.90
2081	1.20	1–2	1.24	1–2	2.43	9.06	8–10	11.49	10–13	17.17	14.80 21.80
2070	2.64	2½–3	3.16	2½–3	2.75	10.48	9–10	13.23	22.–25*	25.31	21 40 24.90
1755	5.00	5–6	4.04	4–5	1.54	8.52	7–9	10.06	.....	30.18	27.40 33.80
2072	2.21	2–2½	2.09	2–2½	1.73	9.94	9–10	11.67	.....	21.69	18.80 22.00
1865	2.26	1¾–3	2.38	2–4	1.44	10.61	9–11	12.05	10½–13½	22.75	18.95 27.70
1858	1.36	1½–2½	2.36	1½–3	1.20	8.16	8½–10	9.36	9½–12	16.95	16.80 23.70
1861	3.49	3–4	6.75	6–8	1.70	8.67	9–11	10.37	10–13	28.64	26.40 34.40
1840	3.72	3–5	3.49	2¾–4	1.33	10.65	10–12	11.98	13–16	28.23	25.55 35.80
1689	3.85	2½	1.37	1.	3.15	6.76	6.	9.91	.....	22.92	15.70
1688	5.23	5.	3.35	3.	3.51	7.32	6.	10.83	.....	30.48	25.20
1821	5.70	5.	2.38	2.	3.86	6.86	6.	10.72	.....	30.47	24.20
1687	3.08	3.	2.48	2.	2.98	8.74	8.	11.72	.....	24.00	20.60
1819	3.20	3.	2.04	1½	3.33	8.21	8.	11.54	.....	23.49	20.10
1811	1.15	1½–2½	2.27	2–3	1.14	10.50	10–12	11.64	12–14	19.00	19.10 26.10
1890	1.28	1½–2½	2.28	2–3	1.14	10.22	10–12	11.36	12–14	19.06	19.10 26.10
1698	10.96	10.	2.34	.....	5.97	6.92	.....	12.89	.....	47.14	30.00
1820	2.83	2½	1.61	1.48	1.84	6.88	5.32	8.72	8.83	19.46	17.47
2025	....	.....	2.19	2–3	1.97	10.29	10.–12	12.26	11–13	13.27	12.40 15.40
1824	1.60	1¼	1.43	1.	1.22	9.06	8.	10.28	.....	17.83	14.35
1825	3.29	3–4	5.33	5–6	1.30	7.68	6–8	8.98	.....	25.20	21.20 27.60
1826	.....	.....	.....	.....	1.28	14.42	14–16	15.70	15–18	14.42	14.00 16.00

*Bone Phosphate; divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1828	Tygert-Allen Fertilizer Co., Philadelphia, Pa.	Six Per Cent Guano	Pocomoke
1827	" " "	Standard Bone Phosphate	Pocomoke
1923	" " "	*Bone Phosphate	Elkton
1829	" " "	*Pure Bone Meal	Pocomoke
1928	J. E. Tygert Co., Philadelphia, Pa.	*Bone Phosphate	North East
2022	J. Tyson & Son, Frederick, Md.	Ammoniated Superphosphate of Lime	Monrovia
2028	W. H. D. Warfield, Sykesville, Md.	Potato Compound	Sykesville
2029	" " "	Potato Compound	Sykesville
1894	S. L. Webster & Son, Cambridge, Md.	No. 1 Ammoniated Bone Phosphate	Baltimore
2063	" " "	Poudrette Mixture	Baltimore
2111	" " "	Special Wheat Grower Ammo'd Bone Phos.	Baltimore
2083	Richard C. Wells, Baltimore, Md.	Ammoniated XL Bone Phosphate	Baltimore
1696	Frank M. Wilson, Pocomoke, Md.	Favorite Truck Fertilizer	Pocomoke
1695	" " " "	Peninsula Ammoniated Superphosphate	Pocomoke
1920	" " " "	Special Peninsula Phosphate	Pocomoke
1697	" " " "	Worcester Guano	Pocomoke
1943	Wooldridge Fert. & Chem. Co., Baltimore, Md.	Chicago Bone Meal	Aberdeen
1892	" " " "	Eye XCD	Baltimore
1807	" " " "	"Hard Pan" Bone Truck Phosphate	Baltimore
1850	" " " "	Honest Dollar	Baltimore
1812	" " " "	Kangaroo Komplete Kompound	Baltimore
1806	" " " "	Orchilla Guano	Baltimore

Maryland Agricultural College, February to July, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed.	Found.	Guaranteed.		
1828	6.01	6–7	5.02	5–6	1.23	8.14	6–8	9.37	.....	$33.57	$30.20 36.60
1827	2.42	2.	2.35	2.	1.25	9.11	8.	10.36	.....	21.29	17.60
1923	2.54	2½–3	2.88	2½–3½	1.39	9.70	8½–10	11.09	10½–13	22.97	21.40 25.30
1829	4.71	4–5	.....	.....	.....	.....	.....	23.20	21–23	28.89	.....
1928	2.01	2¼–3¼	2.26	2½–3½	.88	12.06	9–11	12.94	11–14	23.31	21.25 28.25
2022	2.09	2–3	.31	1–2	4.26	9.31	7–10	13.57	.....	20.31	15.40 23.00
2028	1.95	1½	2.23	4†	.67	10.30	9.	10.97	.....	20.84	17.40
2029	2.61	2½–3	1.77	2–2½	2.85	8.90	9–11	11.75	10–13	21.99	20.90 25.90
1894	3.02	3.	2.73	5†	4.56	7.10	10.	11.66	22*	23.05	23.90
2063	.98	.51	2.42	3.01	1.47	6.98	6½	8.45	7.62	14.62	13.01
2111	2.88	2½	2.60	2½	1.22	7.42	7.	8.64	14.*	20.87	17.40
2083	2.48	2½–3	1.87	2–3†	6.76	10.64	13–15	17.40	.....	26.14	24.10 28.50
1696	2.93	3⅛–3⅜	3.88	4–5	3.49	8.38	9¼–9½	11.87	.....	24.82	24.48 26.54
1695	1.18	⅝–2¼	1.59	1⅞–2⅜	3.38	10.67	10½–13½	14.05	.....	19.96	16.60 25.70
1920	1.66	1–2	2.08	1⅞–2⅜	3.94	9.39	9–11	13.33	.....	20.69	15.55 21.95
1697	2.53	2–3	2.08	2–3	2.91	9.15	8–10	12.06	.....	22.40	17.60 24.00
1943	1.92	2½	.....	.....	.....	.....	.....	19.40	30*	22.00	.....
1892	7.67	10.	3.72	4.	2.21	8.65	8.	10.86	10.	38.44	44.80
1807	3.34	3½	4.03	3½	1.25	9.40	8.	10.65	10.	26.08	24.80
1850	3.65	3½	7.25	7.	2.10	9.42	8.	11.52	17*	30.76	27.10
1812	1.66	1.35	4.00	4.	4.61	9.80	8.	14.41	11.	23.51	19.45
1806	....	.....	.....	.....	9.34	4.53	.....	13.87	14.	9.18	.....

†Sulphate Potash; divide by 1.85 to reduce to Potash.
*Bone Phosphate; divide by 2.18 to reduce to Phosphoric Acid.

Table of Analysis and Valuation of Fertilizers Made at the

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Place of Sampling.
1753	Wooldridge Fert. & Chem. Co., Baltimore, Md.	Quick Step	Baltimore
1808	" " " "	XXTRA Acid Phosphate	Baltimore
1843	Zell Guano Co., Baltimore, Md.	Calvert Guano	Baltimore
2084	" " " "	Dissolved Bone Phosphate and Potash	Baltimore
2094	" " " "	Economizer	Baltimore
1844	" " " "	Electric Phosphate	Baltimore
2096	" " " "	Pure Ground Raw Bone	Baltimore
1705	" " " "	Special Compound	Pocomoke
1706	" " " "	Truck Grower	Pocomoke

Maryland Agricultural College, February to July, 1895, continued.

NO.	NITROGEN Calculated as AMMONIA.		POTASH.		PHOSPHORIC ACID.					Comparative Value per Ton Found.	Comparative Value per Ton Guaranteed.
					Insoluble Found.	Available.		Total.			
	Found.	Guaranteed.	Found.	Guaranteed.		Found.	Guaranteed	Found.	Guaranteed.		
1753	3.80	1.35	3.48	4.	2.16	10.27	8.	12.43	12	$28.50	$19.45
1808	.....	.....	.....		2.74	15.52	14.	18.26	30*	15.52	14.00
1843	1.10	¾	1.85	1½	1.02	11.77	9.	12.79	11.	19.90	15.75
2084	.....		.80	1.	.91	14.38	12.	15.29	14.	15.54	13.80
2094	1.47	1	1.51	1.	3.10	9.93	9.	13.03	11.	19.70	16.00
1844	.....		2.20	2–3	1.70	11.96	10–12	13.66	12.–15	14.84	12.80 to 16.20
2096	4.50	4–5	.....		.....	.....		21.04	45–55*	26.85	.....
1705	3.57	3.	4.30	4.	.80	9.67	8.	10.47	10.	27.09	23.80
1706	5.59	5½	4.12	4.	.60	9.58	7.	10.18	9	32.75	30.10

*Bone Phosphate; divide by 2.18 to reduce to Phosphoric Acid.

Bulletin No. 34, July, 1895.

Table Showing the Mechanical Analysis of Ground Bone.

(The Chemical Analysis is Given in Preceding Table.)

No.	Name and Address of Manufacturer.	Name of Fertilizer.	Fine, Less than 1-50 inch.	Fine-Medium, 1-25 to 1-50 inch.	Medium, 1-12 to 1-25 inch.	Coarse, Larger than 1-12 inch.
1937	Baker & Morgan, Aberdeen, Md.	Pure Raw Bone Meal	40	45	15	.....
1792	Baugh & Sons Co., Baltimore, Md.	Bone Meal	44	47	9	.....
1837	" " " "	Bone Meal, "Soft Bone"	43	33	24	.....
1776	John Bullock & Sons, Baltimore, Md.	Pure Ground Raw Bone	23	20	29	28
2071	Claremont Abattoir Co., Baltimore, Md.	Pure Ground Bones	34	23	29	14
1948	E. A. Clendenin & Bro., Colora, Md.	Pure Ground Bone	23	31	29	17
1929	J. A. Cranston Co., Newport, Del.	Bone Meal	32	27	23	18
1932	Eureka Fertilizer Co., Perryville, Md.	Bone Meal	57	28	15	.....
1864	W. S. Farmer & Co., Baltimore, Md.	Ground Bone	48	33	14	
1896	Griffith, Turner & Co., Baltimore, Md.	Ground Bone	26	26	41	
1935	S. M. Hess & Bro., Philadelphia, Pa.	Ground Bone	48	24	8	.....
1796	J. Horner, Jr. & Co., Baltimore, Md.	Slaughter House Bone Dust	31	35	34	.....
2098	Hubbard & Co., Baltimore, Md.	Warranted Pure Raw Bone	32	30	28	.....
2057	C. M. Keedy, Keedysville, Md.	Ground Bone	71	17	8	
1684	Joseph Lister, Chicago, Md.	Pure Bone Meal	39	28	33	.....
2040	P. Mann & Co., Washington, D. C.	Pure Bone Meal	35	25	20	20
1912	Maryland Agricultural Co., Baltimore, Md.	Pure Bone Meal	46	26	28	.....
2068	Maryland Fertilizing Co., Baltimore, Md.	Pure Fine Ground Animal Bone	39	23	23	15
1897	Miller Fertilizer Co., Baltimore, Md.	Ground Bone	54	26	14	6
1712	" " " "	Pure Bone Meal	48	39	13	.....
1871	North-Western Fertilizer Co., Chicago, Ill.	Horseshoe Brand Fine Raw Bone	32	28	40	.....
1888	" " " "	Horseshoe Brand Ralston Bone Meal	35	21	28	19
1971	R. H. Pollock, Baltimore, Md.	Ground Animal Bone	56	30	14	.....
1875	W. A. Pleasants, Baltimore, Md.	Pure Bone Meal	45	55	.....	.....
1976	The Henry Reckord M'f'g Co., Bel Air, Md.	Raw Bone	16	28	36	20
1938	Scott Fertilizer Co., Elkton, Md.	Ground Raw Bone, Guaranteed Pure	32	25	31	12
1931	" " " "	Pure Ground Bone	33	22	36	9
2076	Susquehanna Fertilizer Co., Baltimore, Md.	Fine Ground Bone	32	30	38	.....
2075	" " "	Pure Ground Bone	26	29	35	10
1829	Tygert-Allen Fertilizer Co., Philadelphia, Pa.	Pure Ground Bone	29	27	44	.....
1943	Wooldridge Fertilizer & Chemical Co., Baltimore, Md.	Chicago Bone Meal	62	20	14	4
2096	Zell Guano Co., Baltimore, Md.	Pure Ground Raw Bone	26	35	39	.....

TABLE OF FERTILIZERS LICENSED FOR SALE IN MARYLAND FOR THE YEAR 1895. CORRECTED TO JUNE 24th.

Baker & Morgan, Aberdeen, Md.

High Grade Compound.
Pure Raw Bone Meal.

Baltimore Pulverizing Co., Baltimore, Md.

Farmers' Favorite Fertilizer.

Baugh & Sons Co., Philadelphia, Pa.

Animal Bone and Potash Compound.
Double Eagle Phosphate.
Export Bone with Potash.
Fish Mixture.
General Crop Grower.
High Grade Acid Phosphate or Dissolved S. C. Rock.
High Grade Potato Guano.
High Grade Tobacco and Truck Fertilizer.
New Process 10 Per Cent Guano.
Old Stand-By.
Peruvian Guano, 10 Per Cent Ammonia.
Potato Fertilizer.
Pure Dissolved Animal Bone.
Pure Raw Bone Meal.
Special Potato Manure with 10 Per Cent Potash.

Beck & Walker, Chestertown, Md.

Corn Phosphate.
Tomato Phosphate.

Chas. E. Bond, Spencerville, Md.

Ground Bone.
Superphosphate.

James Bonday, Jr., Baltimore, Md.

Genuine Kainit—Old Reliable Brand.

John Bullock & Sons, Baltimore, Md.

Dissolved Pure Raw Bone.
Pure Ground Raw Bone.

Chesapeake Guano Co., Baltimore, Md.

Ammoniated Alkaline.
Ammoniated Bone Phosphate.
Bone and Potash.
Chesapeake Guano.

Corn and Oats.
Dissolved Bone Phosphate.
Gem.
Monogram.
Potato Grower.

Chemical Co., of Canton, Baltimore, Md.

Baker's Special W. C. & Y. Mixture.
Dissolved Animal Bone.
Pure Dissolved S. C. Bone.
Red Clover.
Soluble Alkaline Bone.

Claremont Abattoir Co., Baltimore, Md.

Ground Bone and Potash.

J. A. Cranston & Co., Wilmington, Del.

Horseshoe Soluble Bone.
Raw Bone Meal.

Crocker Fertilizer and Chemical Co., Buffalo, N. Y.

Ammoniated Wheat and Corn Phosphate.
New Rival Ammoniated Phosphate.
Niagara Phosphate.
Potato, Hop and Tobacco Phosphate.
Practical Ammoniated Superphosphate.
Special Potato Manure.

Rufus K. Day, Brownsville, Md.

Ammoniated Bone Phosphate.

Wm. Davidson & Co., Baltimore, Md.

"Boss'" Ammoniated Superphosphate.
High Grade Ammoniated Superphosphate.
Pen Mar Ammoniated Bone.

L. E. P. Dennis, Crisfield, Md.

No. 1 Fish and Potash Mixture.
No. 2 Fish and Potash Mixture.
Seven Per Cent Potato and Pea Mixture.
Special Truck and Tomato Mixture.

Detrick Fertilizer and Chemical Co., Baltimore, Md.

Ammoniated Bone Phosphate.
Corn Fertilizer.
Dissolved Bones.
Dissolved S. C. Bone.
Excelsior Compound.
Farmers' New Method.

Farmers and Planters' Agency Ammoniated Bone.
" " " Chandos Guano.
" " " Orient Guano.
Mason's No. 4.
P Mixture.
Potato Fertilizer.
Pure Raw Bone Meal.
Sea Fowl Guano.
Soluble Bone Phosphate and Potash.
Special Mixture.
Snyder's High Grade Potato Feltilizer.
Stouffer's Ammoniated Superphosphate.
Tobacco Plant Bed Fertilizer.
Wheat Fertilizer.
W. D. Wheat Compound.
Vegetable Compound.
Vegetator Ammoniated Superphosphate.

John W. Dorsey, Ellicott City, Md.

Ammoniated Phosphate.
Stag Potato Phosphate.

Dudley & Carpenter, Baltimore, Md.

Ammoniated Soluble Bone Phosphate.
California Tobacco Compound.
Dissolved S. C. Bone.
Dissolved S. C. Rock Phosphate.
Special Tobacco Plant Guano.
Special Wheat Mixture.

T. H. Eckenrode, Taneytown, Md.

O. K. Phosphate.

Thos. W. Eliason, Chestertown, Md.

Chester Compound.
No. 1 Ammoniated Superphosphate.
"M. P."
Our Special.
Our XXX.

David Englar, Jr., Medford, Md.

No. 3 Bone.

Englar & Rinehart, Linwood, Md.

No. 1 Ammoniated Bone Phosphate.
No. 2 Ammoniated Bone Phosphate.

Eureka Fertilizer Co., Perryville, Md.

Alkaline Bone and Potash.
Bone Meal.
Corn and Potato Special.

*Farmer's Favorite Bone Phosphate.
Imperial Bone Phosphate.
Potato and Vegetable.
P. & P. Acid Phosphate.
*Raw Bone Phosphate.

Excelsior Guano Co., Baltimore, Md.

Excelsior No. 1 Peruvian Guano and Soluble Phosphate.

Farmers' Fertilizer Co. of Carroll County, Westminster, Md.

No. 1 Bone Phosphate.
No. 2 Bone Phosphate.
No. 3 Bone Phosphate.
XX Bone Phosphate.

W. S. Farmer & Co., Baltimore, Md.

B. & P. Fertilizer.
Bone Meal.
Clyde Brand.
Dissolved S. C. Bone.
Ground Bone.
Harvest Queen.
No. 1 Potato Manure.
Potato Compound.
Special Tobacco and Potato Guano.
Special Tomato and Wheat Guano.
Seven Per Cent Potato Guano.
Standard Phosphate.

N. I. Gorsuch & Sons, Westminster, Md.

Westminster Dissolved Raw Bone Phosphate.
Westminster No. 3 Bone.

G. W. Grafflin & Son, Baltimore, Md.

Alkaline Phosphate.
Ammoniated Bone Phosphate.
Bone Compound.
Crop Grower.
Dissolved Bone.
Excelsior Fruit Producer.
Forsythe & Linthicum Mixture.
Pocomoke.
Pure Dissolved S. C. Bone.
Special Tomato and Potato.

Griffith & Boyd, Baltimore, Md.

Acid Phosphate.
Ammoniated Bone.
Ammoniated Soluble Bone.

*License for One of these Brands only.

Bone Meal.
Cereal.
Pure Dissolved Bone.
Spring Crop Grower.
Stable Manure Substitute.
Valley.

Griffith & Lytle, Baltimore, Md.

Ammoniated Soluble Bone Phosphate.
Special Potato Fertilizer.
Standard Bone Fertilizer.

Griffith, Turner & Co., Baltimore, Md.

Animal Bone Phosphate.
Ammoniated Alkaline Plant Food.
Ammoniated Butchers' Bone Phosphate.
Dissolved Bone.
Ground Bone.
High Grade Acid Phosphate.

Wm. R. Griffith, Baltimore, Md.

Dissolved S. C. (G) Floats.
Hard Times (G) Phosphate.
Local Option (G) Superphosphate and Potash.
Special (G) for Tobacco.
Slaughter House (G) Phosphate.
The Trucker (G) Phosphate.
Try It (G) Phosphate.

S. M. Hess & Bro., Reading, Pa.

Ammoniated Bone Superphosphate.
Ground Bone.
Keystone Bone Phosphate.
Potato and Truck Manure.

Joshua Horner, Jr., & Co., Baltimore, Md.

Ammoniated Raw Bone Superphosphate.
Cultivator Superphosphate.
Dissolved Slaughter House Bone Dust.
Maryland Concentrated Superphosphate.
Slaughter House Bone Dust.

Hubbard & Co., Baltimore, Md.

Columbia Gem Phosphate.
Dissolved Raw Bone.
Farmers' IXL Superphosphate.
High Grade Soluble S. C. Phosphate.
Standard Bone Superphosphate.
Trucker's 7% Royal Seal.
Wheat Growers' Jewal.

M. P. Hubbard & Co., Baltimore, Md.

Ammoniated Bone and Potash.
Celebrated Dissolved Bone Phosphate.
Farmers' Acme.

T. R. Hubbard & Son, Chestertown, Md.

Extant or A. A. Bone.
Imperial Compound.
Peerless Fertilizer.

R. Humphreys, Salisbury, Md.

Our Mixture B.
Our Mixture F.

S. L. Lamberd & Co., Baltimore, Md.

Boss.
Favorite.
Soft Ground Bone.
Special Potato Grower.

Lister's Agricultural Chemical Works, Newark, N. J.

Animal Bone and Potash.
Celebrated Ground Bone.
Harvest Queen.
Potato Manure.
Special Potato Fertilizer.
Standard Phosphate.

Mapes Formula and Peruvian Guano Co., New York, N. Y.

Complete Manure, "A" Brand.
Complete or Vegetable Manure.
Potato Manure.
XXV Phosphate.

Maryland Fertilizing and Manufacturing Co., Baltimore, Md.

Alkaline Bone.
Ammoniated Bone.
Bone Tobacco Fertilizer.
Dissolved Animal Bone.
Dissolved Phosphate.
Dissolved S. C. Bone.
Fine Ground Animal Bone.
Globe Complete Manure.
Langston Cereal Plant Food.
Linden Superphosphate.
Potato Food.
Tobacco Food.
Tomato Fertilizer.

Maryland Agricultural Co., Baltimore, Md.

Excello Soluble Phosphate.
Paragon Phosphate.

Maryland Grange Agency, Baltimore, Md.

Agency's Favorite.
Dissolved S. C. Rock.
Special Wheat Grower.

F. Mehring, Buceville, Md.

Acid Phosphate.
Ammoniated Superphosphate No. 2.
Banmgardner's Mixture.
Dissolved Raw Bone.
Emmert's Half and Half.
Twenty-six Dollar Phosphate.

Miller Fertilizer Co., Baltimore, Md.

Ground Bone.
Harvest Queen Phosphate.
Hustler Phosphate.
No. 2 Potato Fertilizer.
Potato Phosphate.
Pure Bone Meal.
S. C. Rock.
Special Potato Fertilizer.
Standard Phosphate.

Moore, Donahoe & Co., Baltimore, Md.

Natural Plant Food.

Geo. R. Mowell, Glencoe, Md.

Pure Dissolved S. C. Rock.
Standard Bone Phosphate.

Mt. Airy Manufacturing Co., Baltimore, Md.

Baldwin Avalon Basic Stag Fertilizer.
Bone Phosphate.
Insula Guano for Corn, Oats and other Spring Crops.
Mt. Airy Alkaline Dissolved Bone.
Mt. Airy Garden Truck Fertilizer.
Mt. Airy S. C. Bone.
Piedmont Dissolved Bone Phosphate.
Piedmont Guano for Tobacco.
Piedmont Potato Grower.
Piedmont Potato Producer.
Piedmont Pure Raw Bone Mixture.
Piedmont Special Tobacco Bed Fertilizer.
Piedmont Special for Tobacco Beds.
Piedmont Special Truck Fertilizer.

J. B. Nichols & Son., Baltimore, Md.

Farmers' Friend.

Nickerson Fertilizer Co., Easton, Md.

Bone and Potash.
Eastern Shore Domestic Guano.
High Grade Vegetable Compound.
S. C. Phosphate.
S. C. Phosphate and Potash.
Truck Guano.

North Western Fertilizer Co., Chicago, Ill.

Ammoniated Dissolved Bone.
Corn and Potato Grower.
National Bone Dust.
Prairie Phosphate.
Rallston's Bone Meal.
Raw Bone, Fine.

G. Ober & Sons, Baltimore, Md.

Avondale Ammoniated Dissolved Bone.
Dissolved Animal Bone.
Dissolved Bone Phosphate.
Dissolved Bone Phospnate and Potash.
Farmers' Standard Ammoniated Phosphate.
Locust Point Compound.
Pure Bone Meal.
Soluble Ammoniated Superphosphate of Lime.
Special Ammoniated Dissolved Bone.
Special Compound for Tobacco.
Special Tomato and Vegetable Fertilizer.

Patapsco Guano Co., Baltimore, Md.

Baltimore Soluble Phosphate.
Coon Brand Guano.
Dissolved Raw Bone.
Early Trucker.
Grain and Grass Producer.
Grange Mixture.
Patapsco Ammoniated Corn Fertilizer.
Patapsco Tobacco Fertilizer.
Pure Dissolved S. C. Bone.
Special Wheat Compound.

Wm. A. Pleasants, Baltimore, Md.

Bone and Peruvian Producer, for Irish and Sweet Potatoes.
Peruvian and Bone Special Fertilizer for Tobacco.
Peruvian and Bone Vegetable Food for all Early Garden Truck
Pure Bone.
Special Corn Fertilizer—Bone and Peruvian.

R. H. Pollock, Baltimore, Md.

Ammoniated Bone Phosphate.
Dissolved Animal Bone.
Dissolved S. C. Bone.
Early Truck Guano.
Ground Animal Bone.
Soluble Bone Phosphate.
Special Potato and Tobacco Fertilizer.
Special Wheat Grower.
Superior Corn and Tomato Fertilizer.

Powell Fertilizer and Chemical Co., Baltimore, Md.

Bone and Potash.
Dissolved S. C. Bone.
Green Bag.
Hard Times.
Red Bag.

Rasin Fertilizer Co., Baltimore, Md.

Ammoniated Alkaline Phosphate.
Bone and Potash.
Dissolved S. C., or Acid Phosphate.
Empire Guano.
Ground Bone.
Sea Island Guano.
Rasin's Dissolved Bone.
Josh. Walker's Dissolved Bone Phosphate.
Josh. Walker's Dissolved S. C. Phosphate.
Josh. Walker's Economical Bone Phosphate.
Josh. Walker's Old Pittsburg Phosphate.
Josh. Walker's Victoria Bone Phosphate.

Ramsburg Fertilizer Co., Frederick, Md.

Corn and Potato Fertilizer.
Dissolved Animal Bone.
Dissolved Bone Superphosphate.
Excelsior Plant Food.
Excelsior Plant Food.
Old Virginia Compound.

Henry Reckord Manufacturing Co., Bel Air, Md.

Animal Bone Phosphate.
Dissolved S. C. Bone.
Fine Ground Bone.
Raw Bone.
Special Compound.

John S. Reese & Co., Baltimore, Md.

Challenge Crop Grower.
Dissolved Phosphate.
Mayflower.
Pilgrim.
Potato Special.

W. G. Rinehart, Westminster, Md.

No. 2 Fertilizer.
No. 3 Fertilizer.

H. S. Roberts, Westminister, Md.

Big Gun.
Dissolved S. C. Rock.
Governor.
Leader.
Pride.
Special Potato Manure.
Super A.
Vine and Vegetable Compound.

Scott Fertilizer Co., Elkton, Md.

Pure Dissolved Bone.
Pure Raw Bone.
Standard Phosphate.
Sure Growth Compound.
Sure Growth Superphosphate.
Tip Top Soluble Bone.

G. W. Sharretts & Co., Baltimore, Md.

Ammoniated Bone.
Ammoniated Superphosphate.
Bone Phosphate.
Fish, Rock and Potash.
Potato Fertilizer.
Wheat and Grass Fertilizer.

Sharpless & Carpenter, Philadelphia, Pa.

Acid Phosphate or Dissolved S. C. Phosphate.
Cabbage and Tomato Guano.
Dissolved Bone Phosphate.
Gilt Edge Potash Manure.
No. 1 Bone Phosphate.

J. D. Simmons, Hagerstown, Md.

Wheat and Clover Producer.

Slingluff & Co., Baltimore, Md.

Ammoniated Bone.
Canner's Compound.
Corn and Oats or Alkaline Superphosphate.
Dissolved South Carolina Rock.
McAfee's Potato Grower.
Potato Grower.
Pure Dissolved Raw Bone.
Tobacco Bed Fertilizer.
Truckers' Favorite.
Universal Guano.

Stonebraker & Son, Hagerstown, Md.

Dissolved Bone Phosphate.
Dissolved S. C. Rock.
Standard Dissolved Bone.

Jos. A. Stouffer, New Windsor, Md.

Butcher House Phosphate.
Soluble Wheat Grower.

J. W. Sullivan, Monrovia, Md.

Sure Success.

Susquehanna Fertilizer Co., Baltimore, Md.

Ammoniated Bone Phosphate.
Dissolved Boue.
Packing House Bone.
Potato Phosphate.
Pure Bone Phosphate.
Pure Ground Bone.
Superior Rock Phosphate.
XXV Phosphate.

Talbot & Clark, Ellicott City, Md.

Ammoniated Bone Phosphate.
Potato Manure.

H. S. Taveau & Co., Baltimore, Md.

Allerton Guano.
Special Componnd.

I. P. Thomas & Son Co., Philadelphia, Pa.

Farmers' Choice Bone Phosphate.
Fish Guano.
Improved Super Phosphate.
Normal Bone Phosphate.
Potato Manure.
Pure Ground Animal Bone.
S. C. Phosphate.
Tip Top Raw Bone Superphosphate.

Wm. B. Tilghman Co., Salisbury, Md.

Fish Mixture.
Irish P.
Mixture B.

Walter Todd, Preston, Md.

No. 1.

E. S. Truitt, Salisbury, Md.

Fish Mixture XX.

Turner & Son., Betterton, Md.

Special Tomato Compound.

Tygert-Allen Fertilizer Co., Philadelphia, Pa.

Ammoniated Bone Phosphate.
Gold Edge Potato Guano.
High Grade Dissolved South Carolina.
Pure Ground Bone.
6% Guano.
Soluble Bone and Potash.
Standard Bone Phosphate.
Star Bone Phosphate.

The J. E. Tygert Co., Philadelphia, Pa.

Bone Phosphate.

J. Tyson & Son., Frederick, Md.

Ammoniated Superphosphate.
Half and Half.

W. H. Warfield & Co., Sykesville, Md.

Potato Compound.

S. L. Webster & Son, Baltimore, Md.

No. 1 Bone Fertilizer.
No. 2 or Special Wheat Grower.
Our Special.
Poudrett Mixture.
6% Guano.

Frank M. Wilson, Pocomoke City, Md.

Favorite Truck.
Peninsula.
Special for Wheat.
Worcester for Truck.

Williams & Clark, New York, N. Y.

Acorn Brand Acid Phosphate.
Bone Meal.

Bone and Potash.
Prolific Crop Producer.
Royal Bone Phosphate.

Wooldridge Fertilizer Co., Baltimore, Md.

Bone and Potash Mixture.
Chicago Eagle Bone.
Dissolved Bone.
Eye X. C. D.
Hard Pan.
Honest Dollar.
Kangaroo Komplete Kompound.
Orchilla Guano.
Quick Step.
Raw Bone.
Silver Gray.
Sockless and Shoeless.
XXTRY Acid Phosphate.

Zell Guano Co., Baltimore, Md.

Ammoniated Bone Super Phosphate.
Calvert Guano.
Dissolved Bone Phosphate.
" " " and Potash.
Economizer.
Pure Ground Raw Bone.
Special Compound for Potatoes and Vegetables.
Truck Grower.

THE VALUATION OF FERTILIZERS.

The last two columns of the table give, side by side, the "comparative value found," or calculated from the analysis made in the College laboratory, and the "comparative value guaranteed" i. e. the value calculated from the guaranteed analysis as stamped on the bags, using the same standards as before. This shows at a glance whether the fertilizer is more or less valuable than guaranteed. It does not show, however, variations due to irregular mixing, when a deficit of one ingredient is balanced by a corresponding excess of another.

The standards of valuation in use for the current year are as follows:

In Mixed Fertilizer:		
For Nitrogen, calculated as Ammonia	15	cts. per pound
" Potash (K_2O), in forms free from muriate	6	" " "
" Potash (K_2O), as muriate	5	" " "
" Available Phosphoric Acid	6	" " "
" Insoluble Phosphoric Acid	3	" " "
" " " " when from S. C. Rock	2	" " "
In Dissolved S. C. Rock:		
Available Phosphoric Acid	5	" " "
In Ground Bone:		
For Nitrogen, calculated as Ammonia, in "Fine" Bone	14	" " "
" Nitrogen, calculated as Ammonia, in "Fine-Medium" Bone	12	" " "
" Nitrogen, calculated as Ammonia, in "Medium" Bone	10	" " "
" Nitrogen, calculated as Ammonia, in "Coarse" Bone	8	" " "
" Phosphoric Acid in "Fine" Bone	5	" " "
" " " " "Fine-Medium" Bone	4	" " "
" " " " "Medium" "	3	" " "
" " " " "Coarse" " "	2	" " "
In Tankage:		
For Nitrogen, calculated as Ammonia	15	" " "
" Phosphoric Acid	3	" " "
In Nitrate of Soda:		
For Nitrogen, calculated as Ammonia	12	" " "

The "comparative values *found*" by using these figures are not intended to represent the proper selling prices of fertilizers at the place of sale or use. The rates used are the wholesale prices at which a pound of phosphoric acid, potash and ammonia can now be purchased in their various forms for cash, in our large markets, *plus 25 to 50 per cent.* This, it is thought, is sufficient to cover the cost of mixing and bagging. The freight rate from Baltimore should be added when comparing prices in other parts of the State.

Ground bone is sifted into four successive grades of fineness, as follows:

Less than 1-50 inch, "Fine."
Less than 1-25 inch, "Fine Medium."
Less than 1-12 inch, "Medium."
Over 1-12 inch, "Coarse."

Each grade has its own valuation assigned for both phosphoric acid and ammonia as given above. The results are given in the table marked "mechanical analysis of ground bone."

MARYLAND

Agricultural Experiment Station.

BULLETIN NO. 35.

Wheat, Barley, Oats and Hay Experiments.

COLLEGE PARK, MD.

September, 1895.

MARYLAND

Agricultural Experiment Station.

ADVISORY COMMITTEE OF BOARD OF TRUSTEES.

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JOS. R. OWENS, M. D.....*Treasurer.*
CHARLES W. RIDER,.....*Stenographer.*

Located on the B. & O. R. R., 8 miles N. of Washington, D. C.

NOTICE.

The bulletins of the Station will be mailed free to any citizen of Maryland who sends his name and address to the Station for that purpose.

Correspondents will please notify the Director of changes in their post-office address, or of any fallure to receive the bulletins.

ADDRESS,
MARYLAND AGRICULTURAL EXPERIMENT STATION,
COLLEGE PARK, MARYLAND.

AGRICULTURAL DEPARTMENT.

Wheat, Barley, Oats and Hay Experiments,

For the Year 1895.

SUMMARY OF RESULTS.

1.—All things considered, the Fultz and Currell's Prolific would seem to be the varieties of wheat best adapted to this section. Currell's Prolific has an average yield for five years of 41.6 bushels, and Fultz for four years of 36.7 bushels per acre.

2.—The six varieties that have given the best yields for the past three years are as follows, with their respective yields:

Fultz, 41.8 bushels.
Currell's Prolific, 41.5 bushels.
Valley, 41.2 bushels.
Badger, 40.5 bushels.
Tuscan Island, 39.7 bushels.
Wisconsin Triumph, 39.6 bushels.

3.—Spring barley seeded in the fall yielded 26 bushels to the acre; winter barley yielded 48.4 bushels to the acre. Wheat under the same conditions yielded 28.6 bushels to the acre.

4.—Winter barley, which was cut when the grain was in the dough state, was brighter in color than that which was allowed to stand until the grain had hardened.

5.—Winter oats yielded at the rate of 31.6 bushels to the acre.

6.—Stone lime applied at the rate of 20 bushels to the acre for corn, after increasing that crop 34.7 per cent. and the following crop of wheat 37 per cent., made a difference of 1,270 pounds to the acre, or 91.3 per cent. in the amount of hay cut.

Wheat Experiments, 1895.

By Robt. H. Miller and E. H. Brinkley.

VARIETY TEST.

Twenty-two varieties of wheat were tested at the Station the season of 1895. The plots contained one-tenth of an acre each; a space of two feet being left between plots. Every 5th plot was seeded to Currell's Prolific wheat as a check plot. The land occupied by plots 1 to 7 inclusive, had been in potatoes the season of 1893, the balance was in corn that year; the spring of 1894, a section of the corn stubble was planted to early potatoes (that afterward occupied by plots 8 to 12 inclusive); the remainder of the corn land and the plot which had been in potatoes the season of 1893, was sown to cow peas the 11th of May, 1894; the peas made a good growth, and were turned under the last of August and rubbed down immediately so that they might decay as soon as possible. The land was harrowed and rubbed at intervals during September, until it was gotten in fine tilth.

The wheat was sown the 28th of September, 1½ bushels to the acre, and seeded to timothy.

Four hundred pounds of fertilizer was drilled in before seeding the wheat, and 100 pounds at time of seeding. This fertilizer was composed as follows:

800 lbs. Dissolved South Carolina Rock,
600 " Fish Scrap,
250 " Nitrate of Soda,
350 " Muriate of Potash.

As was explained in the September Bulletin of last year, the two forms of nitrogen were used; the one, nitrate of soda, to give the wheat a good start in the fall—it being quick in its action—and the fish scrap, which is slower to carry the wheat through to maturity.

As shown in the following table, every variety came up well and made a fine stand, which condition continued throughout the season, which was a favorable one. At the time of ripening, extremely hot showery weather ripened most of the varieties off too suddenly; as a result the grain was more or less shriveled: this is evidenced by the light weight per bushel of nearly all the varieties. The wheat was cut June 22d, and allowed to stand in shock until the 13th of July, when it was threshed.

As will be seen from Table 1, the average of the 22 varieties was at the rate of 36 bushels to the acre. The following Tables I and II, give the yields, etc.:

TABLE I.

SHOWING VARIETIES AND YIELDS OF WHEAT TESTED THE SEASON OF 1895.

PLOT NO.	VARIETY.	YIELD PER ACRE OF GRAIN.	WEIGHT OF ONE BUSHEL	COLOR OF GRAIN.	TIME OF RIPENING.
		Bus.	Lbs.		
1	Garfield	24.2	57.6	Red.	Medium.
2	Valley	39.1	58.9	Red.	Medium.
3	Beal	31.7	57.2	Amber.	Medium.
4	Fultz	36.6	58.9	Red.	Early.
5	**Currell's Prolific**	31.7	57.4	Red.	Early.
6	Winter Fife	31.8	58.9	Red.	Late.
7	Wisconsin Triumph	35.6	58.5	Amber.	Early.
8	Finley	36.2	59.1	Red.	Medium.
9	Nigger	33.8	58.4	Red.	Early.
10	**Currell's Prolific**	32.9	.....	Red.	Early.
11	Egyptian	29.6	58.2	Red.	Medium.
12	Jones' Square Head	27.8	54.6	White.	Late.
13	Tuscan Island	38.1	59.4	Red.	Medium.
14	Poole	39.1	58.9	Red.	Early.
15	**Currell's Prolific**	42.3	.....	Red.	Early.
16	Rocky Mountain	38.1	59.2	Red.	Early.
17	Wyandott Red	38.8	59.2	Red.	Medium.
18	Badger	38.2	61.1	Red.	Early.
19	Dietz	37.1	60.4	Red.	Early.
20	**Currell's Prolific**	39.1	.....	Red.	Early.
21	Extra Early Oakley	42.4	61.2	Amber.	Early.
22	Lebanon	33.4	60.4	Red.	Medium.
23	Ontario Wonder	39.7	61.1	Red.	Late.
24	Lehigh	37.0	60.0	Red.	Medium.
25	**Currell's Prolific**	38.9	.....	Red.	Early.
26	Ruby	41.0	60.7	Red.	Late.
	Average Yield	36.0			

TABLE II.

SHOWING PRINCIPAL CHARACTERISTICS OF VARIETIES OF WHEAT GROWN—1895.

Plot No.	Variety.	Character of Head.		Date of Coming into Head.	Nature of Straw.		Stand of Grain.
		Length in Inches.	Bearded or Smooth.		Length Ft. In.	Stiffness.	
				May			
1	Garfield	2¾	Smooth	11	4—4	Fairly Stiff	Extra
2	Valley	2½	Bearded	11	4—5	Stiff.	"
3	Beal	2½	Bearded	15	4—5	Stiff.	"
4	Fultz	2½	Smooth	13	4—4	Stiff.	"
5	**Currell's Prolific**	2½	Smooth	19	4—2	Fairly Stiff	"
6	Winter Fife	2¾	Smooth	21	4—5	Stiff.	"
7	Wisconsin Triumph	2½	Smooth	13	4—0	Stiff.	"
8	Finley	2½	Smooth	9	4—4	Fairly Stiff	"
9	Nigger	2½	Bearded	13	4—4	Fairly Stiff	"
10	**Currell's Prolific**	2½	Smooth	13	3—10	Fairly Stiff	"
11	Egyptian	2½	Bearded	17	4—2	Fairly Stiff	"
12	Jones' Square Head	3	Smooth	17	4—6	Stiff.	"
13	Tuscan Island	3	Bearded	15	4—7	Stiff.	"
14	Poole	3	Smooth	10	4—4	Stiff.	"
15	**Currell's Proiific**	2½	Smooth	13	4—2	Fairly Stiff	"
16	Rocky Mountain	2¾	Smooth	10	4—4	Stiff.	"
17	Wyandott Red	3	Smooth	10	4—2	Stiff.	"
18	Badger	3	Smooth	10	4—7	Stiff.	"
19	Dietz	2¾	Bearded	13	4—11	Fairly Stiff	"
20	**Currell's Prolific**	2¾	Smooth	9	4—6	Fairly Stiff	"
21	Extra Early Oakley	2½	Smooth	9	4—4	Stiff.	"
22	Lebanon	2½	Bearded	13	4—8	Fairly Stiff	"
23	Ontario Wonder	3	Smooth	13	4—9	Stiff.	"
24	Lehigh	2½	Bearded	13	4—10	Weak.	"
25	**Currell's Prolific**	3	Smooth	13	4—7	Fairly Stiff	"
26	Ruby	2½	Bearded	17	4—8	Fairly Stiff	"

In the following table No. III will be found the yields of varieties of wheat tested at the Station the past season, together with the yields for other years of the varieties in this list, which have been previously tested, and the average yields of those varieties for the years grown:

TABLE III.

AVERAGE YIELDS OF WHEAT FOR THE YEARS GROWN.

VARIETY.	1895	1894	1893	1891	1890	NUMBER OF YEARS GROWN.	AVERAGE.
Garfield	24.2	44.2	42.5	10.3	.....	4	30.3
Valley	39.1	42.9	41.7	.....	6.7	4	32.6
Beal	31.7	42.3	26.8	.....	.....	3	33.6
Fultz	36.6	41.7	47.1	21.4	.....	4	36.7
Currell's Prolific	42.3	45.5	36.8	19.7	13.6	5	31.6
Winter Fife	31.8	41.0	.....	10.6	.....	3	27.8
Wisconsin Triumph	35.6	35.4	47.9	14.5	.....	4	33.3
Finley	36.2	40.2	33.6	20.2	12.7	5	28.6
Nigger	33.8	39.0	24.0	7.5	6.5	5	22.2
Egyptian	29.6	39.2	28.0	16.3	15.4	5	25.7
Jones' Square Head	27.8	40.0	32.8	.....	.....	3	33.5
Tuscan Island	38.1	38.7	42.4	7.8	16.6	5	28.7
Poole	39.1	36.5	.....	12.5	9.9	4	24.5
Rocky Mountain	38.1	33.3	.....	.....	.....	2	35.7
Wyandott Red	38.8	35.7	27.6	19.6	12.7	5	26.9
Badger	38.2	37.1	46.1	.....	9.3	4	32.7
Dietz	37.1	38.9	42.0	10.5	21.2	5	29.9
Extra Early Oakley	42.4	38.7	29.6	17.9	.....	4	32.1
Lebanon	33.4	39.3	30.2	.....	.....	3	34.3
Ontario Wonder	39.7	36.1	31.3	8.5	4.6	5	24.0
Lehigh	37.0	35.2	31.4	.....	.....	3	34.5
Ruby	41.0	.....	.....	.....	.....	1	41.0

As will be seen from table III Currell's Prolific has the best average yield of any of the varieties for the five years that variety tests have been made, 31.6 bushels to the acre; but the Fultz, which for so many years has proven such a valuable variety to the wheat growers of this and other States, still holds its place in the variety tests of having the best average yield for the four years it has been grown, 36.7 bushels to the acre.

BARLEY AND WHEAT COMPARED.

With the object of continuing the work undertaken the fall of 1893, that of comparing the relative profits of barley and wheat, three plots of winter barley, containing one-tenth acre each, were sown the 15th of September, at the rate of two bushels of seed to the acre. Five hundred and sixty pounds of fertilizer was applied of the same composition as that used on variety wheats. Alternating with these three plots of barley, there were seeded the 29th of September three plots of wheat. The variety selected, Winter Fife, had yielded at the rate of 41 bushels to the acre, the season of 1894. One and a-half bushels of wheat was seeded to the acre, and the same application of fertilizer made as applied on the barley.

Adjoining the last plot of wheat a plot of six rowed spring barley was seeded on the 24th of September, being treated in every particular as was the fall barley.

The wheat ripened off too rapidly, and the yield was evidently reduced in this way. The winter barley, like that which was grown here last year, was badly affected with black smut, and the yield would, no doubt, have been materially increased had the seed been treated, as recommended by the Indiana Experiment Station, Bulletin No. 35, 1891, this treatment is equally effective for preventing smut in wheat and oats, and is as follows: "Immerse the seed grain for five minutes in water standing at first at 135 to 145 F., which may drop during the operation to 130, or may even fall below 130, if the time is correspondingly prolonged.

After drying, by spreading upon a floor, the seed may be sown immediately or after a time, with equally beneficial results in either case." The summary of the above bulletin referred also states that:

"This treatment not only removes the smut from the crop, but improves the growth and increases the yield."

"The increased yield is sufficient to pay for the labor and trouble of treatment several times over."

TABLE IV.

SHOWING COMPARATIVE YIELD OF WHEAT AND BARLEY.

	BUSHELS PER ACRE.
3 one-tenth acre plots of Wheat averaged	28.6
3 one-tenth acre plots of Winter Barley, averaged	48.4
1 one-tenth acre plot of Spring Barley	26.0

As will be seen in table IV the winter barley yielded 19.8 bushels more than the wheat, and 22.4 bushels more than the spring barley.

As the market for barley does not open in Baltimore until about the first of September, in order to compare the profits of wheat and barley we will assume that the barley will bring at that time what it did last year, that is, 50 to 55 cents per bushel; putting it at the lower figure, 50 cents, and wheat at the price it now commands, 70 cents, and estimating the cost of raising the wheat at 50 cents per bushel and the barley at 30 cents per bushel, we have the following table showing the comparative profits per acre of the two crops:

TABLE V.

COMPARATIVE PROFITS OF WHEAT AND BARLEY.

ACRES OF GRAIN.	YIELD PER ACRE.	VALUE PER BUSHEL.	GROSS RECEIPTS.	COST OF RAISING.	NET RETURNS.
1 Acre Barley	48.5	$ .50	$24.25	$14.55	$9.70
1 Acre Wheat	28.6	.70	20.02	14.30	5.72
Gain for Barley					$3.98

While we have made no experiments as to time of sowing barley, we believe that earlier seeding, about the first, rather than middle of September, would give better results; when sown at this time on strong land it will prove valuable as a fall and early spring pasture. One of the finest crops grown in Montgomery county last year (that of Mr. R. B. Farquhar, 55 bushels to the acre) was pastured most of the winter with sheep, and the past season Mr. Francis Thomas, of the same county, raised a very promising crop, which was pastured hard, both fall and spring.

EFFECT OF TIME OF CUTTING BARLEY ON THE COLOR OF THE GRAIN.

As the price of barley for brewing purposes is largely governed by the color of the grain, (the brighter the color the higher price paid), a piece of land was seeded to winter barley for the purpose of ascertaining whether the time of cutting it has any relation to the color of the grain. Three cuttings were made, the first June 6th; at this time the straw was mostly ripe and the grain was nearly all in the dough state; the second cutting was made two days later, June 8th, when the straw was ripe and the grain all in the dough state; the third cutting was made June 10th, when the straw was entirely ripe and the grain quite hard.

On threshing it was ascertained that there was a very perceptible difference in the color of the three cuttings; that which was cut last being the darkest, the first cutting next in shade, and the middle or second cutting the brightest in color.

The following are the weights of the respective lots:

1st	Cutting,	39.6	lbs.	per	bushel.
2d	"	41.1	"	"	"
3d	"	40.1	"	"	"

WINTER OATS.

In the same field and immediately adjoining the plot on which the spring barley was grown, a plot of winter oats was sown September 24th; the variety is what is known as Virginia Winter Oats—2 bushels to the acre being seeded and 400 pounds of fertilizer applied of the same composition as that used on variety wheats. One-half of the plot laid rather low, water standing on it at times; as a result, the oats on this part made a poor stand, which must have reduced the yield at least 30 per cent. The crop was cut June 28th, and yielded at the rate of 31.6 bushels to the acre.

We believe that winter oats, like barley, should be sown earlier, about the first of September, especially where it is intended to be used as fall pasture, which is one of the points claimed for it. We shall make several sowings this fall with a view of ascertaining the proper time to seed it.

EFFECT OF LIME IN YIELD OF HAY.

In Bulletin 25, of this Station, was reported the effect in increasing the crop of corn of an application of 20 bushels of stone lime (applied to the land just before planting the corn.) The gain was 5¾ bushels to the acre, or 34.7 per cent.

Bulletin 28, gave the effect of the lime on the following crop of wheat, a gain of 8.5 bushels to the acre, or 37 per cent.

As was stated in the report of this last experiment referred to "Effect of Lime on Wheat," "another striking effect is the very much better stand of clover where the lime was applied, in fact there is scarcely any clover at all where there was no lime, while there is an excellent stand on the plot which was limed. It will be interesting to note another season, the comparative yields of hay from the two plots."

The effect of the lime in increasing the crop of hay, as will be seen from the following Table, is very much more striking than its effect either on corn or wheat, as the apparent gain from its use was 1271 pounds to the acre, or 91.3 per cent.

TABLE VI.

LIMED VS. UNLIMED HAY PLOTS:

	YIELD OF HAY PER ACRE.
Limed	2662 lbs.
Unlimed	1391 "
Gain from Lime	1271 lbs.

From present appearances there will be a greater difference in the yield of hay in the two plots another year than there was this, as weeds are rapidly taking the place of the timothy (there being no clover) on the plot which received no lime, while on that which was limed there are very few weeds and the sod is constantly improving.

MARYLAND

Agricultural Experiment Station.

BULLETIN NO. 36.

Steer Feeding.

A Well Balanced vs. A Poorly Balanced Ration.

COLLEGE PARK, MD.

December, 1895.

MARYLAND

Agricultural Experiment Station.

Located on the B. & O. R. R., 8 miles N. of Washington, D. C.

NOTICE.

The bulletins of the Station will be mailed free to any citizen of Maryland who sends his name and address to the Station for that purpose.

Correspondents will please notify the Director of changes in their post office address, or any failure to receive the bulletins.

ADDRESS,
MARYLAND AGRICULTURAL EXPERIMENT STATION,
COLLEGE PARK, MARYLAND.

Experiments in Feeding Steers. 1894 and 1895.

COMPARATIVE PROFITS OF A WELL BALANCED AND A POORLY BALANCED RATION.

By Robert H. Miller and E. H. Brinkley.

The results of the experiments recorded in this bulletin form a continuation of the experiment begun the winter of 1893, and reported upon in Bulletin No. 22, of that year. It is a recognized experience of cattle feeders that there are great variations from year to year in the amount and facility with which cattle will gain in flesh, and in consequence the resulting profit varies; it was, therefore, deemed advisable to continue the experiment of 1893, through two more years. The objects and plans of the experiments were precisely the same, namely: The testing of the relative profits of a well balanced and a poorly balanced ration, or more exactly speaking, the testing of the plain ration of corn and cob meal as ordinarily used by cattle feeders with a ration with corn and cob meal as a base, and to which some highly nitrogenous food has been added, so as to have it contain the essential constituents, in the proper proportions, for the production of flesh and fat.

It was found necessary in a few cases to change the method of carrying out the minor details, but the essential points remained nearly constant.

DEFINITION OF RATIONS.

We hear and see a number of terms in relation to cattle rations, and to be sure that all readers of this bulletin have a clear idea of the different terms, it is thought advisable to insert here the definitions of the various terms.

A well-balanced ration is one that has the *carbonaceous* or the heat and fat producing constituents in the proper proportion to the *nitrogenous* or flesh forming constituents in order to produce the desired result, whether that be the production of flesh, fat, work, milk or wool, etc. *A poorly balanced ration* is one that contains these constituents in improper proportions; that is, it may be a ration that contains either too little or too much nitrogenous matter. In the experiment recorded in this Bulletin, the poorly balanced ration had too little nitrogenous matter.

Nutritive ratio is a term used to designate the proportion of nitrogenous to non-nitrogenous (carbonaceous) food constituents.

A wide nutritive ratio is one that has much carbonaceous matter in proportion to the nitrogenous, and a *narrow ratio* is one that has relatively little carbonaceous matter in proportion to nitrogenous.

The same proportions are not applicable to all kinds of animals or for the production of all kinds of energy, but each class and kind of animals require a specific ratio.

REVIEW OF THE RESULTS OF FIRST YEAR'S FEEDING, 1893.

Bulletin No. 22 reports the first of this series of three feeding experiments. The results of this first test were very favorable for the steers fed the well-balanced ration; the four steers which received it, gained 1002 pounds during the ninety days which they were fed, or an average of 250 pounds per steer; while those which received the poorly balanced ration only made a gain of 612 pounds during the same period, or an average of 153 pounds per steer. In the table showing the profit and loss account, it appears that the lot receiving the balanced ration after paying for all food consumed, returned a profit of $39.39, or an average of $9.84 per steer; while those receiving the poorly balanced ration gave a net return of $11.14, or an average of $2.78 per steer, making a difference of $7.06 per steer in favor of the well-balanced ration.

EXPERIMENTS FOR 1894, (SECOND YEAR.)

Cattle used: After a number of trials it was found impossible to get the class of steers for this experiment as was desirable, and consequently the work had to be carried on with those the market offered.

The lot procured were high grade short horns, coming three years old; all of them dark red in color, and had been dehorned as calves. They were a remarkably uniform and handsome lot of cattle. They were in good flesh; very much better than are generally bought for "feeders," and no doubt would have gone to the butchers if they had not been purchased for this experiment.

Eight steers were purchased for this experiment, but owing to an accident to one of the steers, and another proving to be a nervous steer and having a poor appetite, it was necessary to conduct the experiment with but six steers, three in each lot.

COST OF STEERS.

Eight steers weighing 9700 pounds at $4.43 3-10	$430.00
Freight from Baltimore to College	14.00
Total	$444.00

Driftage in shipping 144 pounds.
Cost at College, $4.64 6-10 per cwt.

PRELIMINARY FEEDING.

December 22nd to January 13th.

The steers were purchased in Baltimore on December 20th, arrived at the Station on the 21st, and on the morning of the 22nd were divided into two lots. There was very little difference in the individual steers as to quality or condition; therefore, it was not necessary to consider these

points in making the division, and they were divided so as to have each lot represent the same weight as nearly as possible.

During the preliminary period which continued from December 22d to January 13th, all the steers were given exactly the same treatment and received the same kind and amount of feed. The ration consisted of a mixture of fifteen pounds of corn and cob meal, two pounds of cotton seed meal, two pounds of wheat bran and fourteen pounds shredded corn fodder—the fodder was moistened and the meal mixed with it. Each steer received ten pounds per day of this mixture. The feed for the evening was mixed in the morning and allowed to stand, and the morning's feed was mixed the evening before. Any food left uneaten was weighed back and due credit given to the respective lots.

The following table gives the weights of the steers at the beginning and end of the preliminary period. The January weights are the average of weights taken on the 10th and 13th:

TABLE I.

	LOT I.			LOT II.	
	Dec. 22.	Jan. 13.		Dec. 22.	Jan. 13.
	lbs.	lbs.		lbs.	lbs.
No. 1,	1292	1247	No. 4,	1110	1075
No. 2,	1202	1133	No. 5,	1218	1178
No. 3,	1182	1160	No. 6,	1292	1236
Total,	3676	3540	Total,	3620	3489
Loss,	136		Loss,	131	

During the early part of this period the steers were restless and did not eat well or with any regularity, which accounts for the loss in weight.

COMPARISON OF RATIONS.

Begun January 13th, Ended April 13. Period 91 Days.

After the three weeks of preliminary feeding the steers had become accustomed to their quarters and the kinds of feed they were to receive and were fairly quiet and contented, and the test of rations was begun.

RATIONS USED.

The grain ration of Lot 1 consisted of a mixture of

Corn and Cob Meal	15	Parts.
Cotton Seed Meal	4	"
Wheat Bran	2	"

Lot 2 was given only corn and cob meal.

These grain rations were mixed with moistened shredded corn fodder in the same manner as was followed in the preliminary period. A sprinkling of salt was added to each mixing. It was aimed to feed each steer all he would eat of both grain and fodder. The proportion of grain to fodder was changed from time to time as was found necessary to conform

to the steer's appetite. During the period, Lot 1 averaged 2 1-5 pounds of grain to one pound of fodder, and Lot 2, 2½ pounds of grain to one of fodder.

In addition to the above named foods Lot 1 received two quarts of molasses per day for seven days and Lot 2 received two quarts per day for fourteen days. Also steer No. 2 was given eight pounds of potatoes per day in order to improve his appetite, which was naturally delicate.

TIME OF FEEDING, ETC.

The ration of grain mixed with fodder was given at 7.30 a. m., and 4.30 p. m. They were watered at 10 a. m. and 4 p. m. The steers were weighed at the beginning of each week in the morning before watering. Each day the stables were cleaned and the steers carded with a horse card.

Some of the animals, more particularly those fed the nitrogenous ration, manifested considerable uneasiness due to itching of the parts around the neck and tail; to correct this a handful of flowers of sulphur per day was added to the ration.

The amount and value of food consumed during the fattening period is summarized in the following table.

TABLE II.

TOTAL AMOUNT OF FEED USED AND COST OF SAME.

(Period 91 Days.)

LOT I. BALANCED RATION.			LOT II. POORLY BALANCED RATION.		
KIND OF FOOD.	Lbs. of food eaten.	Cost of Food	KIND OF FOOD.	Lbs. of food eaten.	Cost of Food
Corn and Cob Meal..	2940	$22 05	Corn and Cob Meal..	4396	$33 05
Cotton Seed Meal....	784	14 89	Corn Fodder.....	1785	2 23
Wheat Bran.....	392	3 82	Molasses.....	7 gal.	1 68
Corn Fodder.....	1873	2 34			
Molasses.....	3½ gal.	84			
Potatoes.....	900	1 60			
Total.....	6889	$45.54	Total	6181	$36 96

PRICES OF FEEDS USED.

The values given in the above table are calculated upon the following prices of feed. When the feed was purchased the price includes freight:

Corn fodder	$ 2 50 per ton.
Corn and Cob Meal	15 00 " "
Cotton Seed Meal	29 00 " "
Wheat Bran	19 00 " "

WATER DRUNK.

Lot 1	11,321 lbs.
Lot 2	12,634 "
Difference	1,282 lbs.

It will be noticed that the lot which drank the larger amount of water made the greater gain.

WEIGHTS OF STEERS.

The steers were weighed the beginning of each week just before the time of giving water in the morning. The following table gives the record of weights:

TABLE III. WEEKLY WEIGHT OF STEERS DURING THE EXPERIMENT.

DATE OF WEIGHT.	LOT I.			LOT II.		
	No. 1. lbs.	No. 2. lbs.	No. 3. lbs.	No. 4. lbs.	No. 5. lbs.	No. 6. lbs.
January 13	1247	1133	1160	1075	1178	1236
January 20	1304	1180	1208	1122	1190	1272
January 27	1274	1170	1190	1102	1184	1242
February 3	1314	1162	1200	1116	1208	1264
February 10	1304	1176	1216	1132	1210	1264
February 17	1336	1204	1238	1162	1226	1280
February 24	1306	1226	1264	1172	1224	1290
March 3	1268	1230	1250	1182	1262	1308
March 10	1276	1238	1282	1192	1256	1322
March 17	1304	1242	1290	1200	1242	1334
March 24	1318	1252	1296	1212	1252	1334
March 31	1358	1268	1340	1224	1280	1358
April 7	1338	1286	1346	1230	1298	1372
April 13	1354	1284	1340	1240	1314	1382

	Lot I.	Lot II.
Total weight of steers at end of experiment	3978	3936
Total weight of steers at beginning of experiment	3540	3489
Gains	438 lbs.	447 lbs.

As will be seen from the above table, Lot 2 (fed the poorly balanced

ration) made a slightly greater gain in weight than Lot 1, fed the more highly nitrogenous ration.

This result of the steers fed the poorly balanced (carbonaceous) ration making a better gain than those fed the more nitrogenous ration can in a large measure be attributed to the good condition of flesh and age of the steers at the time of starting the experiment.

It is a well recognized scientific fact that the nitrogenous ration is better adapted to younger steers and those which are thin in flesh, while those in good flesh and mature have not the power to make much growth and flesh and can only lay on fat. An inspection of table IV shows that the gains for the three periods follow the principles advocated by the German standards of using a ration with a wider ratio for the middle period of fattening than that used at the beginning and ending. Also an inspection of table III, page 64, Bulletin 22, of this Station, shows that there came a period in fattening where a more carbonaceous ration was the more profitable.

Condensing the above table into periods and calculating the average daily gains per steer, we have table IV.

TABLE IV. SHOWING TOTAL GAINS AND AVERAGE DAILY GAINS MADE BY PERIODS.

Period.		Well Balanced Ration. Lot I.	Poorly Balanced Ration. Lot II.
	Gain made during first four weeks	156.00 lbs.	117.00 lbs.
1.	Average daily gain during first four weeks	5.57 "	4.18 "
	Average daily gain per steer	1.86 "	1.39 "
	Gain made during second four weeks	100.00 "	164.00 "
2.	Average daily gain during second four weeks	3.57 "	5.86 "
	Average daily gain per steer	1.19 "	1.95 "
	Gain made during last five weeks	182.00 "	166.00 "
3.	Average daily gain during last five weeks	5.20 "	4.74 "
	Average daily gain per steer	1.73 "	1.58 "
	Average daily gain per steer during 90 days	1.62 "	1.66 "

SALE OF STEERS.

The steers were sold to a Washington, D. C., butcher at the weights on the Experiment Station scales after watering and feeding, less twenty-five pounds per steer. Lot I was sold at $4.37½ per hundred, and lot II at $4.12½ per hundred. This difference of twenty-five cts. per hundred could only be attributed to the better appearance of the steers of Lot 1, due to the more nitrogenous ration causing them to shed their hair more quickly and present a good sleek coat.

The following are the selling weights with the amounts received for the same.

Lot 1. Balanced Ration.

3 Steers weighed 4,153 lbs., at $4.37½ $181.68

Lot 2. Poorly Balanced Ration.

3 Steers weighed 4,044 lbs., at $4.12½ $166.81

Profit and loss account of Lots I and II.

	Lot I. Well Balanced Ration.	Lot II. Poorly Balanced Ration.
Dr.		
To first cost of steers	$170 78	$168 18
" cost of food eaten (table II.)	45 54	36 96
" feed eaten preliminary period	4 98	5 00
	$221 30	$210 14
Cr.		
By amount sold for	$181 68	$166 81
Loss	$39 62	$43 33

Loss of Lot II exceeded Lot I by $3.71.

These results are very unsatisfactory from a financial standpoint, from the fact that the prices of steers for feeders in the fall at purchasing time was considerably higher than fat steers brought in the spring at the time of selling; then, too, the class of steers purchased for this experiment was relatively higher than ordinary feeders, consequently both methods of feeding were conducted at a loss; yet there was less loss with the well-balanced ration, or in other words, the results showed an agreement with the experiment of 1893, in that the *relative profits were in favor of a well balanced ration.*

EXPERIMENT OF 1895.

The experiment of this year was a continuation of the test of the two previous years, and was conducted in the same manner and with the same objects, also intending it to be the final test of the series, as the conclusions drawn from the average results of the three years should be a fairly reliable criterion.

Cattle used: About the same difficulty was experienced this year as the year previous in securing the kind of cattle desired, and though the cattle obtained were very nearly in the condition of flesh desired, in order to procure them and have a lot uniform enough for experimental purposes a somewhat higher price had to be paid than would have been otherwise. The steers were grade short horns, coming three years old, and were uniform as to size and condition, and had been raised in the West.

COST OF STEERS.

Eight steers, Baltimore weight, 7575 pounds at $3.85 per cwt.....$291.64
Freight from Baltimore to College..... 14.00

$305.64

Driftage in shipping 555 pounds.
Cost at College $4.15 4-10 per cwt.
The driftage was calculated from the average of three weighings on December 3rd, 5th and 8th.

PRELIMINARY FEEDING.

November 29th to January 14th.

The cattle were purchased in Baltimore, on November the 28th, arriving at the Experiment Station on the 29th. The cattle had been shipped from Chicago and seemed very sore as a result, consequently it was thought best to turn them out to pasture and rest them before beginning the experiment. They were put in the stable at night, and given a feed of soft corn night and morning.

TABLE IV. WEIGHTS OF STEERS AT BEGINNING AND END OF PRELIMINARY PERIOD.

No.	Beginning. lbs.	End. lbs.	Gain. lbs.
1	904	940	36
2	945	982	37
3	870	884	14
4	832	886	54
5	890	924	34
6	851	896	45
7	850	870	20
8	878	908	30

The steers being very uniform as to size and condition it was decided to divide them for the test into lots according to the gains which they had made.

COMPARISON OF RATIONS.

January 15th, to April 9th. Period 84 Days.

The steers were divided according to the weights which they had made during the preliminary period into two lots of four steers each. Soon after beginning the test, one of the steers in Lot 1 proved to have a poor appetite and one in Lot 2 became sick, and they were dropped from the test and the experiment finished with but three steers in each lot.

RATIONS USED.

The rations used with the two lots were the same, respectively, as were used in the test of 1894, with the addition of 10 lbs. of turnips per day per steer.

The feed was prepared and the cattle were fed and cared for in the same manner as described in the previous experiment.

The following table gives the total amounts of feed consumed and the value of the same.

TABLE VI. TOTAL AMOUNT OF FOOD USED AND COST OF SAME.

LOT I. WELL BALANCED RATION.			LOT II. POORLY BALANCED RATION.		
KIND OF FOOD.	Lbs. of food eaten.	Cost of Food.	KIND OF FOOD.	Lbs. of food eaten.	Cost of Food.
Corn and Cob Meal..	2650	$20 40	Corn and Cob Meal..	3301	$25 41
Cotton Seed Meal....	707	7 78			
Wheat Bran.....	353	3 17			
Corn Fodder..... ..	1767	2 19	Corn Fodder.....	1380	1 72
Turnips.....	3600	7 20	Turnips.....	3600	7 20
	9077	$40 74		8281	$34 33

PRICES OF FEED USED.

The values given in the above table were based upon the following prices of feed. When the feed was purchased the price includes freight.

Corn fodder.....	$ 2 50	per ton.
Corn and cob meal.....	15 60	" "
Cotton seed meal.....	22 00	" "
Wheat bran.....	18 00	" "
Turnips.....	4 00	" "

WATER DRUNK.

The following are the amounts of water drunk during the entire experiment:

Lot No I.....	8919 lbs.
Lot No II.....	7179 "
or a difference of.....	1740 "

It will be noticed that this difference represents quite a considerable amount of water, and may in a measure account for the appetite to consume a larger amount of food and consequently help to increase the gain of Lot 1 over Lot 2.

WEIGHT OF STEERS.

The following table gives the weekly weights of steers:

TABLE VII. WEEKLY WEIGHTS OF STEERS DURING THE EXPERIMENTS.

DATE OF WEIGHT.	LOT I.			LOT II.		
	No. 1. lbs.	No. 2. lbs.	No. 3. lbs.	No. 4. lbs.	No. 5. lbs.	No. 6. lbs.
January 14	982	886	940	908	896	924
January 22	1016	932	970	930	896	930
January 29	1044	962	1012	940	916	980
February 5	1070	980	1036	970	936	990
February 12	1100	986	1044	970	928	980
February 19	1114	995	1064	984	940	994
February 26	1146	1020	1106	990	964	1006
March 5	1160	1026	1080	980	980	1000
March 12	1200	1044	1110	998	990	1054
March 19	1220	1068	1124	1006	990	1014
March 26	1222	1068	1132	1020	1004	1032
April 2	1242	1094	1140	1028	1040	1064
April 9	1240	1084	1154	1042	1010	1064

	Lot I.	Lot II.
Total weight of steers at end of experiment	3478	3116
Total weight of steers at beginning of experiment	2808	2728
Gains	670 lbs.	388 lbs.

TABLE VIII. SHOWING TOTAL GAINS MADE IN PERIODS OF FOUR WEEKS.

	Lot I. Well Balanced Ration. Lbs.	Lot II. Poorly Balanced Ration. Lbs.
Gain made during 1st period of 4 weeks	322	150
Average daily gain made during 1st 4 weeks	11.5	5.04
Average daily gain per steer	3.83	1.68
Gain made during second period of 4 weeks	224	164
Average daily gain during 2nd period of 4 weeks	80	5.86
Average daily gain per steer	2.67	1.95
Gain made during third period of four weeks	124	74
Average daily gain made during 3rd period of 4 weeks	4.43	2.64
Average daily gain per steer	1.48	.88

SALE OF STEERS.

The steers were sold to a Washington, D. C., butcher, to be delivered and weighed at the stock yards. The following are the selling weights and the prices received for the same.

Lot 1. Balanced Ration.

3 Steers weighed 3,465 lbs., at 5¾ cts.....$199.23

Lot 2. Poorly Balanced Ration.

3 Steers weighed 3,130 lbs., at 5¼ cts.....164.32.

PROFIT AND LOSS ACCOUNT OF LOTS I AND II.

	Lot I. Well Balanced Ration.	Lot II. Poorly Balanced Ration.
Dr.		
To first cost of steers	$116 64	$113 32
" cost of food eaten (Table II.)	40 74	34 33
" feed eaten preliminary period	4 33	4 33
	$161 71	$151 98
Cr.		
By amount sold for	$199 23	$164 32
Profit	$37 52	$ 12 34

The results of this test give a net profit of $12.51 per steer, with those fed the well balanced ration and $4.11 per steer with those fed the poorly balanced ration, or a profit of $8.40 per steer in favor of the well balanced over the poorly balanced ration.

These results agree very closely with those obtained in the first test, and the results of all three tests agree in the fact that the well balanced ration is the more profitable.

SUMMARY OF RESULTS OF THREE TESTS.

The results obtained during the first and third tests were nearly identical in every respect, and the gains in flesh and fat and the consequent increase in value gave a decided profit from a financial point of view for the well balanced ration over the poorly balanced one.

The results of the second test, owing to the class of steers used and the market value being relatively high in the fall and low in the spring, caused the feeding to be conducted at a financial loss; yet the loss was less with the steers fed the well balanced ration and so to a certain degree corresponded with the results of tests one and three.

Taking the average of the results for the three tests (ten steers), we find that the well balanced ration gave a profit of $3.73 per steer, while the average for the ten steers fed the poorly balanced ration resulted in a financial loss of $1.98 per steer. These results are collected together with the weights of the steers and the amount and value of the food consumed by them.

TABLE IX.

SHOWING THE PRINCIPAL DATA AND PROFITS AND LOSS IN THREE EXPERIMENTS.

	LOT I. WELL BALANCED RATION.			LOT II. POORLY BALANCED RATION.		
	1893	1894	1895	1893	1894	1895
	4 Steers.	3 Steers.	3 Steers.	4 Steers.	3 Steers.	3 Steers.
WEIGHT OF STEERS:—						
At beginning of Experiments	3954	3540	2808	3940	3489	2728
At end of Experiments	4956	3978	3478	4552	3936	3116
Total Gain, (lbs)	1002	438	670	612	447	388
FOOD CONSUMED:—						
Grain, (lbs)	4720	4116	3710	3930	4396	3301
Fodder, (lbs	7752	2773	5367	7504	1785	4980
Total	12472	6889	9077	11434	6181	8281
Total Value	$ 69 14	$ 45 54	$ 40 74	$ 42 57	$ 36 96	$ 34 33
First Cost of Steers	154 21	170 78	116 64	153 66	168 18	113 32
Cost of Steers and Food Eaten	224 85	221 30	161 71	206 23	210 14	151 98
Selling Value, per cwt	5 37½	4 37½	5 75	4 82	4 12½	5 25
Total Selling Value	264 24	181 68	199 23	213 37	166 81	164 32
Profit or Loss	(Profit.) $ 39 39	(Loss.) $ 39 62	(Profit.) $ 37 52	(Profit) $ 11 14	(Loss.) $ 43 33	(Profit.) $ 12 34
Profit or Loss for 3 years (10 Steers)		(Profit.) $ 37 29			(Loss.) $ 19 85	
Profit per Steer		3 73			1 98	

Relative Profit of Lot 1 over Lot 2, in three years (ten steers) ..... $ 57 14
Average Relative Profit per steer of Lot 1 over Lot 2 ..... 5 71

CONCLUSIONS

Drawn from the Results of Three Experiments in Feeding Steers for Beef.

1. That a well balanced ration produced more gain and more profit than a poorly balanced ration.

2. Steers fed the well balanced ration had a higher value per pound than those fed the poorly balanced ration.

3. That the ordinary corn and cob meal used by farmers was unprofitable and needed the addition of some highly nitrogenous food, such as wheat bran and cotton seed meal to make it profitable.

MARYLAND AGRICULTURAL EXPERIMENT STATION BUILDINGS.

MARYLAND

Agricultural Experiment Station.

EIGHTH ANNUAL REPORT.

COLLEGE PARK, MD.

1895

MARYLAND

Agricultural Experiment Station.

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Located on the B. & O. R. R., 8 miles N. of Washington, D. C.

NOTICE.

The bulletins of the Station will be mailed free to any citizen of Maryland who sends his name and address to the Station for that purpose.

Correspondents will please notify the Director of changes in their post-office address, or any failure to receive the bulletins.

ADDRESS,

MARYLAND AGRICULTURAL EXPERIMENT STATION,

COLLEGE PARK, MARYLAND.

College Park, Prince George's County, Md.

January 29th, 1896.

To His Excellency, Lloyd Lowndes,

Governor of Maryland :

DEAR SIR:—

In accordance with the provisions of Section No. 3, of Act of Congress, "To Establish Agricultural Experiment Stations, etc." I beg leave to submit my report of the operations of the Maryland Agricultural Experiment Station, for the year ending December 31st, 1895, and also a statement of the receipts and disbursements for the fiscal year ending June 30th, 1895, covering the eighth annual appropriation.

Very respectfully,

ROBT. H. MILLER,

Director.

EIGHTH ANNUAL REPORT

—OF THE—

Maryland Agricultural Experiment Station.

FOR THE YEAR 1895.

REPORT OF THE DIRECTOR.

Station Staff.—The only changes in the Station Staff during the past twelve months have been the election of Mr. H. J. Patterson, to the position of Vice-Director, and the vacancy in the chair of entomology caused by the very sudden death of Professor C. V. Riley. The loss of so eminent and experienced an entomologist will be keenly felt, not only in Maryland, but in other States where he was so well and favorably known. His thorough equipment for, and enthusiasm in his work made his connection with the Experiment Station, not only a matter of pride to those associated with him on the Station Staff, but they also realize that the services already rendered by him were highly appreciated by the people of the State, and that the completion of his outlined plan of work, to give the life history and habits of all the injurious insects of the State, with suggestions for their remedial treatment, would have reflected credit upon the Station, and would have been of great advantage to the agricultural interests.

Publications.—During the past year the following publications have been issued:

Jan., 1895, Seventh Annual Report.

Jan., 1895, Bulletin No. 30, Special Issue, Composition of Commercial Fertilizers sold in this State.

March, 1895, Bulletin No. 31, Potato Experiments.

April, 1895, Bulletin No. 32, The San Jose Scale.

April, 1895, Bulletin No. 33, Horticultural and Agricultural Departments. Small Fruits, Vegetables and Field Corn.

July, 1895, Bulletin 34, Special Issue, Composition of Commercial Feltilizers sold in this State.

September, 1895, Bulletin No. 35, Wheat, Barley, Oats and Hay Experiments.

December, 1895, Bulletin No. 36, Steer Feeding. A Well Balanced vs. Poorly Balanced Ration.

Permanent Improvements.—The dairy interest of the State has grown to such proportions as to demand recognition at the hands of the Station; this system of husbandry not only increases the fertility of the soil, but, at the same time, offers better opportunities for profit than many other branches of farming, and in order to encourage the industry we have deemed it proper to put into effect plans which we have enter-

tained for several years, which were to erect and equip a dairy building for experimental work in the handling of milk, butter and cream, and also a barn for the accommodation of cows. This department is in charge of Mr. H. J. Patterson, and will be more fully explained in his report which follows.

In addition to the above buildings, a tobacco barn has been erected for experimental flue curing of tobacco.

All of the buildings on the Station property, except the tobacco barn, have been thoroughly painted during the past season, by which the general appearance of the place is greatly improved. A permanent sheep pasture has been enclosed with a dog-proof fence, which was made necessary because of the frequent occasions on which the sheep were molested. All of the open ditches on the place, amounting to about one mile have been deepened and an addition alone opened through a piece of swamp land which has been cleared. This land embraces some four acres, and from having been in a very wild and totally unproductive condition has been thoroughly reclaimed, having been grubbed, drained and plowed, and will be planted to corn the coming spring and afterwards seeded down to permanent pasture.

Correspondence and Mailing List.—We are getting in closer touch with the farmers throughout the State as is evidenced by the increasing number of letters from them, making inquiry as to the various matters pertaining to their interests.

The number of those who receive our Bulletins has materially increased during the past year, we now have between six and seven thousand on our mailing list.

Visitors.—There have been more visitors to the Station during the past year than any previous one during which I have been connected with it. It has now become an established custom with many of the farmers' clubs in the State to pay at least an annual visit to the Station for the purpose of inspecting the work in progress here. Such delegations are especially welcome, for as a rule they represent the most intelligent and progressive of our rural population.

Fairs and Institutes.—For two years previous to this the Station has made an exhibit of its products at most of the fairs of the State, but the past season there were other matters of pressing importance which claimed our attention and it was thought best not to attend the fairs; but, as it is believed that much good may result to the farmer from the object lessons which are presented in this way, it will be our aim to exhibit at the fairs the coming year.

There is an increasing demand each year from different sections of the State for the officers of the Station to attend farmers' gatherings, such as clubs, conventions or institutes, and while it is our pleasure to aid the farmer in every way possible, the demand on our time is often excessive. Should a much needed Department of Farmers' Institutes be established in the State, it will be the means of relieving the officers of the Station of some of this work.

EXPERIMENTAL WORK, AGRICULTURAL DEPARTMENT.

Weather Report.—The season of 1895 has been no exception to the rule of the past three years of having a severe drouth during July and August. This drouth has interfered very seriously with some of the field experiments, more particularly with the fertilizer tests. Corn seemed to feel this lack of moisture less than any of our crops. This was probably owing to the fact that the land on which it grew had a heavy clover sod plowed down, which was thoroughly prepared with harrow and drag (a necessity in the event of having a drought to contend with); this rendered the soil exceedingly friable and gave the roots an opportunity of finding all of the moisture that was available.

The following is a summary of the rain-fall for this and preceding years at College Park.

YEARS.	1889	1890	1891	1892	1893	1894	1895
Rain-fall in inches.....	59.59	32.29	50.55	41.47	36.22	33 20	35.54
No days on which rain fell.....	135	151	128	137	102	98	89

The following table gives a comparison of the rain-fall at College Park, Washington, Baltimore and Cumberland, together with the normal precipitation for those places. Also the normal temperature and the mean temperature for 1895, at the same places.

PLACE OF RECORD.	TEMPERATURE.		RAIN AND SNOW-FALL.	
	Normal.	Mean for 1895.	Normal in Inches.	In 1895 Inches.
College Park, Md.....	54.0	53.1	41 27	35.54
Washington, D. C.....	54.7	54 2	44.50	34 25
Baltimore, Md.....	55.5	54 2	44.18	40 47
Cumberland, Md.....	50.8	51.0	33.79	23.02

Wheat.—The experiments that have been made with wheat during the past year have been:

First, variety tests, twenty varieties having been seeded. In this test of varieties of wheat which has now covered a term of five years, it has been interesting to note the fact that the variety which for so many years has been the favorite one with the farmers of the State, the Fultz, still holds its place as being the wheat best adapted to this latitude. Another experiment has been testing the comparative profits of wheat

and barley. In this test the winter barley gave much the larger yield, but as this variety is not suitable for brewing purposes, it has to be thrown on the market as a feed, and the price it has commanded the past season would not justify its being sown as a substitute for wheat.

Potatoes.—We have followed out the same lines of investigation with potatoes as those reported last year. Many of the experiments with the late crop were very seriously interfered with by the extremely hot, dry weather which prevailed at the time the potatoes most needed moisture. The early crop on the contrary had to contend with excessive moisture, some of the varieties being badly drowned out, but those that made a good stand gave an excellent yield.

Tobacco.—The growing and curing of tobacco is under the supervision of the chemical department and will be reported under that head.

Crimson Clover.—Crimson clover has been quite extensively sown at the Station the past season, and notwithstanding the extremely dry weather, we have as a rule had excellent stands. When seeding it in corn we have followed the practice recommended in last year's report of sowing just ahead of the last working of corn, the cultivation being a shallow one, thereby covering the seed lightly.

The best stands which we have are after early potatoes and on land which grew a crop of tobacco. When plowed down for corn the past season it very materially increased the crop, as it did also a crop of potatoes. The coming year we will test its value in maintaining the fertility of the soil on land which will have been cropped in corn three years in succession. When purchasing seed it is very important to test its germinating power, as it often happens that bad seed is thrown on the market. As the price of crimson clover seed for the past two years has steadily declined there is no excuse for not sowing a liberal quantity—not less than twenty pounds to the acre should be seeded—and it should be the aim to sow as early in the season as possible so that the plant may become established before dry weather sets in.

Lime Experiments.—In addition to the experiments with lime referred to in the report of the chemical department, we have continued the one mentioned in the last annual report. This was the application of twenty bushels of stone lime on corn the spring of 1893, which increased the crop 38 per cent. The corn land was seeded to wheat and the increased yield of wheat the summer of 1894, was 37 per cent. The past season a crop of hay was harvested and the gain from the use of lime amounted to 91 per cent. The results of this experiment are very suggestive, and unfortunately only a relatively small proportion of farmers throughout the State are availing themselves of this most potential agent for increasing their crops and improving their soils.

Feeding Experiments.—A feeding experiment was begun with steers the winter of 1893, which had for its object the testing of the relative profits of a well balanced and a poorly balanced ration, or more exactly speaking, the testing of the plain ration of corn and cob meal as

ordinarily used by cattle feeders, with a ration with corn and cob meal as a base, and to which some highly nitrogenous food has been added, so as to have it contain the essential constituents, in the proper proportions for the production of flesh and fat. This feeding test was repeated the winters of 1894 and 1895. Bulletin No. 36, reports the results of the last two feeding tests and gives a summary of the three. As is shown in the summary of results of the three years, the well balanced ration proved very much the more profitable.

Sheep.—The flock of imported Shropshire sheep mentioned in my last annual report as having been purchased for the Station, has done remarkably well the past year. Nine lambs were raised from the eight ewes; the buck lambs were sold to farmers for the purpose of grading up their flocks.

Before closing my report, I wish to express my sincere appreciation of the courtesy and support extended to me at all times by the Board of Trustees.

ROBERT H. MILLER, *Director.*

A FLOCK OF IMPORTED SHROPSHIRE SHEEP.

REPORT FROM THE CHEMICAL DEPARTMENT.

To the Director:

SIR:—The work carried on in the Chemical Department during the past year has, in the main, been similar to that of the year previous with the addition of the proposed experiments which were outlined in my last report.

Dairy Experiments.—In June you requested me to submit plans and specifications, with estimates, for a dairy building and equipping the same, to be presented to the Board of Trustees for their consideration, and in September you requested a plan for a cow-barn for the same purpose. These plans met the approval of the Board, and you delegated me to receive bids and superintend the carrying out of the details of the work of building and equipping the department and also to take charge of the department and conduct the dairy experiments after all was complete.

I am pleased to report that this work has been completed and that we now have a dairy and dairy-herd which will give us ample facilities for conducting experiments of interest to dairy farmers, and so meet a long felt want and a constantly increasing demand. Our equipment consists of a creamery building containing main work-room, an ice house, a refrigerator, an engine room, a milk testing room, a room for cleaning and washing utensils, an office and a vestibule. In this building we shall have the necessary apparatus for conducting work upon a practical basis according to the most modern and approved methods; and at the same time, have facilities for testing new apparatus or methods as they are offered. In this work my aim will be to study the creamery problems and feeding questions upon a basis directly applicable to Maryland conditions.

The cowstable is fitted up with a variety of stalls and cattle ties illustrating the most modern and approved methods in this line.

I append, herewith, photographs of these buildings, giving exterior and interior views, also drawing showing the floor plans.

Tobacco Work.—The experiments with tobacco have been a continuation of those of previous years in regard to curing and variety tests; in addition some fertilizer tests of a somewhat different character from those previously conducted have been carried on. Root washings of the tobacco plant at different stages of growth have been made and photographs of the same taken so as to show the relative amounts and development of that part of the plant above and below ground. There is still considerable laboratory work to be done with this year's crop before any results can be given.

Meteorological Records.—This work has been conducted precisely the same as outlined in my last report. A summary of this year's data is appended herewith.

Farmers' Meetings and Correspondence.—During the year, as in previous years, I have attended a number of farmers' meetings, institutes, clubs, granges, etc., and given talks on subjects relative to farm operations. It has always been the aim in these talks to show how chemistry was helping to solve the whys and wherefores that confronted the farmer and to show in a practical way how the latest results of research could be applied to the every day operations of the farm. These meetings draw on my time to a marked degree and break in upon the home work considerably; yet, I believe, it is time well spent, as we are enabled by such methods to get our results before the farmer in the most intelligible form, and at the same time find out what the farmers are thinking about and what questions are of the most interest to them, and should demand our attention in Station work.

The correspondence of this department is constantly increasing and, in the most part, consists of inquiries relative to fertilizers, feed stuffs and dairying, and at the present time it requires at least the equivalent of one day a week to answer such letters.

Phosphoric Acid Experiments.—Last spring I inaugurated, with your approval, a series of experiments with phosphoric acid. The object was to test the availability of different forms of phosphoric acid, and methods for rendering insoluble phosphoric acid available in the soil. The first crop grown in this test was corn. The results will be forthcoming. The following is the programme of the treatment of the several plots:

PHOSPHORIC ACID EXPERIMENT.

Plots One-Tenth of an Acre Each.

Plot No.	Kind of Fertilizer and Treatment.	Quantity.* Per Plot.	Quantity Per Acre.
	Crimson Clover Seeded in Corn.	Lbs.	Lbs.
1	Double Superphosphate (Soluble P_2O_5)..	32	319
2	Dissolved Bone Black (Soluble P_2O_5)....	73½	735
3	Dissolved S. C. Rock (Soluble P_2O_5).....	100	1000
4	Double Superphosphate (Reverted P_2O_5)	37	370
5	Nothing.....	.....	.....
6	Iron Alumina Phosphate (Reverted P_2O_5)	37	370
7	Bone Black (Insoluble P_2O_5).....	51½	514
8	Raw Bone Meal (Insoluble P_2O_5)	66¾	667
9	Slag Phosphate (Insoluble P_2O_5).....	92	920
10	Nothing.....	.....	.....
11	Ground S. C. Rock (Insoluble P_2O_5).....	53	530
12	Florida Soft Phosphate (Insoluble P_2O_5)	56	560
	Ground Left Bare During Winter. *No Green Crop Turned Under.*		
13	Same as No. 8.....	66¾	667
14	Same as No. 9.....	92	920
15	Nothing.....	.....	.....
16	Same as No. 11.....	53	530
17	Same as No. 12.....	56	560
	Rye Seeded on Corn Ground.		
18	Same as No. 8.....	66¾	667
19	Same as No. 9..... ...	92	920
20	Nothing..... ..	.....	.....
21	Same as No. 11.....	53	530
22	Same as No. 12.....	56	560

*These Quantities give each Plot the same quantity of Phosphoric Acid, (150 pounds per Acre).

The land was in wheat in 1889; grass, 1890-91; corn, 1892; fallowed, 1893, and in wheat 1894—clover and timothy seeded in wheat and gave a good set.

Plots were numbered commencing at end next Experiment Station building toward Paint Branch.

Lime Experiments.—A series of plots for some special lime experiments was laid out last spring and planted to corn. The following is an outline of the scheme adopted.

LIME EXPERIMENTS.

Size of Plots 10 Feet by 67 Feet—2 Ft. Space.

Plot. No.		Quantity. Per Acre.	Per Plot.
		Lbs.	Lbs.
1	Stone lime (Calcium Oxide) freshly slacked and applied as a top dressing	1400	20
2	Stone lime (Calcium Oxide) freshly slacked and thoroughly worked into the soil immediately	1400	20
3	Oyster shell lime (Calcium Oxide) freshly slaked and thoroughly worked into the soil	1400	30
4	Oyster shell lime (Calcium Oxide) worked into the soil before slacking	1400	30
5	Magnesium Oxide	1400	25
6	Barium Oxide	1400	20
7	Nothing		
8	Shell marl (Calcium Carbonate)		200
9	Finely ground oyster shells (Calcium Carbonate)		40
10	Gypsum (Calcium Sulfate)		65
11	Gas-house lime (Calcium Sulfate)		45
12	S C. Rock (Calicum Phosphate)		45
13	Coal ashes		200
14	Commercial Fertilizer { Double Superphosphate 200; Tankage 100; Sulphate of Potash 80 }	380	5½

(Plots numbered from road toward the south.)

Co-operative Chemical Work.—As "Reporter on Foods and Feed Stuffs" for the Association of Official Agricultural Chemists, and in continuance of the policy of former years, I have devoted some considerable time to the study of methods of analysis. My report for 1895, has been printed in the proceedings of the above named association. In this capacity I have made a special effort to improve our methods of analyses of cattle foods so that the results would be more tangible and give a better and clearer idea of the real value of food, especially of the carbhydrate compounds. In addition to the work on foods, I have taken part in the work of some of the other reporters of the A. O. A. C. For the coming year, I have been appointed one of the abstracters of chemical literature for the A. O. A. C. These abstracts will be published in the Experiment Station Record.

Miscellaneous Chemical Work.—The demands on this department for analyses of a miscellaneous character are constantly increasing, and whenever the samples so sent in are either of public interest, or have some direct bearing on agriculture or horticulture, they are examined gratuitously. Yet, even with these considerations in mind, many of the samples which I have examined are of interest to so few that the results

of their analyses are not worthy of publication, and, in fact, they almost belong to that class of analyses which were done yesterday, reported to-day and to be forgotten to-morrow; consequently, I do not believe that it would be justice to the public or the Station to expend much time on such a class of substances, therefore I reserve the right to select for examination such as in my judgement are of most general interest and permanent value. Considerable time has been expended in studying methods of analysis applicable to our special lines of work. The study of methods is a class of work that does not come directly in touch with the farmer and his operations and consequently does not appeal to him, and he is prone to think of it as a waste of time and money; nevertheless, on a moment's reflection, it will be apparent to all that it is a very necessary part of Station work. In fact, in the planning of an investigation, it is of paramount importance to be sure that the methods to be employed in the carrying out of that investigation are thorough and scrutinizing so that the results obtained may be beyond reproach.

Laboratory and Equipment.—The laboratory remains substantially the same as indicated in my last report. There has been but little added to the laboratory equipment; the only thing of any special consequence being an autoclave or apparatus for heating under high pressure.

In closing, permit me to assure you of my appreciation of the many courtesies and hearty support which you have given me and my department.

Yours respectfully,

H. J. PATTERSON,

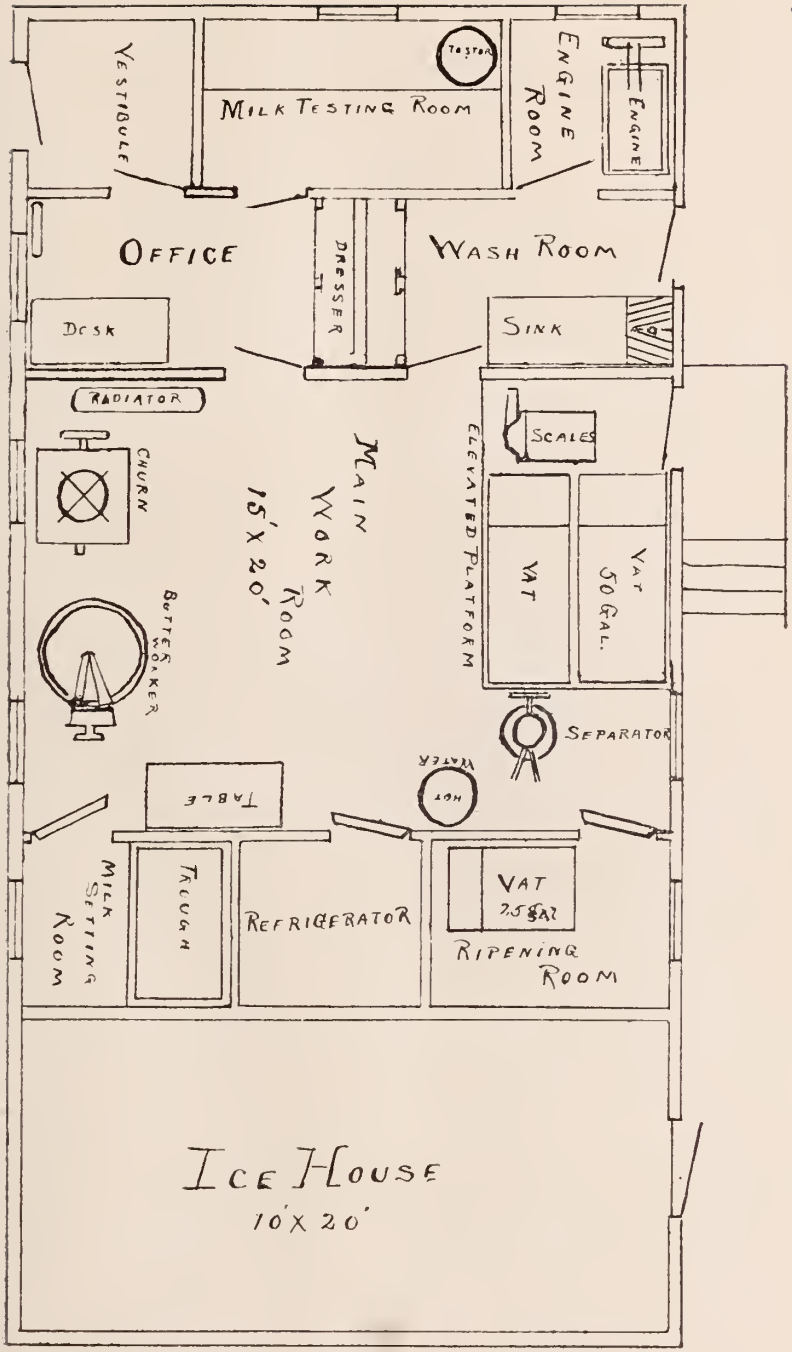
December 31, 1895. *Chemist.*

METEOROLOGICAL SUMMARY FOR 1895.

Temperature in Degrees—Fahrenheit.

MONTH.	Precipitation.	TEMPERATURES—MEAN.				Extreme Maximum.	Extreme Minimum.
		Daily Mean.	Maximum.	Minimum.	Daily Range	Record and Date.	Record and Date.
	Inches						
January	3.79	29.6	38.2	20.5	17.7	49-22nd	10-25th
February	0.70	24.9	34.9	14.4	20.5	57-27th	7-3rd
March	2.73	40.5	51.4	31.4	20.0	72-1st	20-6th
April	5.84	52.1	62.8	40.6	22.2	85-25th	26-4th
May	3.16	61.0	71.9	49.3	22.6	94-30th & 31st	37-17th
June	5.50	72.3	83.9	61.3	22.6	100 2nd	48-8th
July	2.27	71.0	82.2	60.1	22.1	99-22nd	50-31st
August	2.57	77.6	89.2	63.1	26.1	98-11 & 29th	47-1st
September	1.81	70.2	85.5	59.3	26.2	101-23rd	44-15 & 28th
October	1.89	51.4	66.8	34.8	32.0	77-3, 19 & 27th	26-30th
November	1.96	47.1	58.7	38.3	20.4	78-9th	23-29th
December	3.32	39.9	49.2	32.0	17.2	69-23rd & 26th	17-4, 13 & 14th
Yearly	35.54	53.1	64.6	42.1	22.5	101	7

MARYLAND AGRICULTURAL EXPERIMENT STATION CREAMERY.



FLOOR PLAN OF THE MARYLAND AGRICULTURAL EXPERIMENT STATION CREAMERY.

REPORT OF THE DEPARTMENT OF HORTICULTURE.

To Robert H. Miller, Director:

SIR:—I herewith have the honor to submit a summary of the character of the work of this department.

The farmer of Maryland to-day in whatever field of general or special interest, requires for his proper equipment the fullest information along the lines of practical fact relative thereto to enable him most successfully to meet the changing conditions of lower values resulting from larger productions, sharper competition, and ease and rapidity of transportations. This general statement of fact is especially true in regard to the horticultural interest; since, while the expectation of acreage profit might be legitimately larger, the cost of preparation, planting, handling and marketing this line of production is largely in excess of the gross returns from any of the other fields of staple agricultural pursuit. The continuing low price of these staples is constantly recruiting the ranks of those hoping for a better opportunity; the venture often resulting in disappointment. Want of knowledge as to adaptation of varieties, to soil and location, market demands, proper methods of pruning, culture, remedial and preventive measures as to fungus and insect pests, are not unfrequently responsible for this result.

An appreciative desire for fuller information along these indicated lines is evidenced by the largely increasing correspondence with the Station, and requests from time to time to visit different sections of the State and give public lectures on the results of Station work as applicable to the special local interest. These requests as far as time and opportunity would permit have always been complied with.

Horticultural Association.—I will take this opportunity of commending to the attention of the fruit growers of Maryland two facts which I regard as of especial importance to the fruit interest.

One is their need of a State Horticultural Association, which would afford a means through which most valuable information, results of experience and skill could be rapidly and widely disseminated for the information and benefit of those specially interested in this line of work. This instrumentality has accomplished splendid results in other States. The Peninsular Horticultural Association is doing good work in a section of this State. This opportunity ought to cover a larger field and be productive of larger results. The horticultural interest in Maryland is now relatively larger than in any State in the Union, and yet we have no State Association. We have exceptional advantages of climate, soil and location, but these need the supplement of the latest information and best instumentalities.

San Jose Scale.—Another fact I desire to specially emphasize is the presence and spread of the San Jose scale insect. This promises to be the worst pest of them all and a menace to the whole fruit interest. The seriousness of this invasion is due to the fact of the rapidity of its multiplication, destructive effects, cost and difficulty of getting rid of it and the wide range of its food supply, having been found not only on the apple, pear, peach, quince, cherry, currant, gooseberry and raspberry, but also on the persimmon and pecan. As the invasion is of recent years and still confined to the fruits of certain localities, introduced in every case, so far as known, through the purchase of nursery stock, the

effort to stamp it out could be made more effectual than if deferred to a later period. I would suggest in view of the importance of the interests involved the propriety of legislative enactments for the accomplishment of this purpose.

Tomato Blight.—The tomato is largely grown in this State for commercial purposes either to meet the immediate market demands or as an item of interest in the canning industry. For a number of years a blight affecting the foliage of the tomato has been more or less prevalent in different localities. The past season it seems to have been almost universally prevalent.

The trouble is referable to the presence of one of the parasitic fungi resulting in the destruction of a large part of the foliage at a critical period in the growth of the plant, and thereby very injuriously affecting both the quantity and quality of the crop. The suggested preventive is the early and proper spraying with Bordeau and ammoniacal copper solution.

Strawberries.—The interest in the cultivation of the small fruits as a market enterprise is steadily increasing. This is particularly true of the strawberry. The climatic conditions the past year generally were not as favorable for the marketing of the Maryland crop as the season of 1894. The bulk of the Maryland crop finds sale in the Northern markets filling the interval between the falling off of the Southern berries and their own local supply. That interval was shorter this season than ordinary for two reasons. In many sections of our State the early berries suffered badly from late frosts, while the mild winter and early spring hastened the ripening of the Northern crop.

At the Station 145 varieties were in fruitage. The land upon which these were planted was heavy and late, consequently escaping the frosts which caught the earlier bloom in other sections. The crop was exceptionally fine, both as to quality and quantity.

Variety Tests and Fertilizer Experiments on the Eastern Shore.—In deference to the requests of a large number of growers that variety tests and fertilizer experiments should be made upon soils more generally approximating in physical character the lands generally devoted to this crop in the State than those found at the Station, an arrangement was made with Mr. Wm. F. Allen, Jr., of Wicomico Co., to conduct this experiment under the Station's direction. Fifty of the leading varieties were set and the fertilizers applied as directed. The plan as outlined was faithfully carried out with every promise of success for the ascertainment of facts which we hoped would be of public advantage. The character of the land upon which the experiment was conducted is generally what is knwon as the early truck lands of the State. Most of the varieties here were in full bloom at the time of the late frost. The crop was damaged to such an extent, both in quantity and quality as to leave unsettled many points of investigation which we had hoped would be of special interest. As the most profitable growing of the strawberry is generally on this character of land, I would recommend a continuance of the experiment on the same lines and on similar soils.

Very respectfully, JAS. S. ROBINSON, *Horticulturist.*

REPORT OF PHYSICIST.

To Robert H. Miller, Director:

DEAR SIR:—I have the honor to submit, herewith, a report upon the work of this department of the Maryland Experiment Station for the past year.

There have been collected up to this time 577 samples of soils from Maryland. Of this number 221 samples have been analyzed, representing this number of different localities. This collection represents all of the important geological formations and the principal agricultural areas of the State. In addition to this a large collection of the soils of Virginia have been made during the past season, and samples from 161 localities in that State have been analyzed. This work was done through the co-operation of the Virginia Board of Agriculture with the U. S. Department of Agriculture. As the soil formations are the same as those in Maryland, very important light has been thrown upon the soils of Maryland by these investigations of the soils of Virginia. Furthermore the U. S. Department of Agriculture has made an important series of investigations, during the past season, upon the texture and moisture conditions of some of the principal soil formations of the Atlantic Coast States, of which there is a representative of every kind in Maryland, owing to the great variety of geological formations, and this work likewise has an important bearing upon the soil conditions of the State.

During the past year a large number of soil samples, representing the principal agricultural areas of the Eastern Shore, have been examined. This work has been rendered more difficult as there is little reliable knowledge of the distribution of the geological strata of that part of the State.

The most recent investigations confirm the statements which have been made in previous reports that the distribution of crops and of agricultural interests in Maryland are very largely caused by the difference in the texture of the soils and the difference in the conditions which these soils maintain, principally in regard to the amount of moisture they maintain for the use of crops.

I have before called attention to the close similarity between the texture of the soils and the amount of soil moisture in the truck soils of Maryland and in the bright tobacco soils of Virginia and North Carolina. Many of our truck soils, which, for lack of transportation facilities, have little value for truck farming, could probably be very profitably devoted to this bright tobacco industry. It is essential of course that the proper methods of cultivation should be used and that the crop should be cured in a proper manner. The soil conditions simply produce a plant which will assume under certain conditions of curing the bright golden or mahogany color which is so desired.

It is a well recognized fact now that the different classes and types of tobacco require different soils differing greatly in their texture and especially in the amount of water supplied to the crops.

The investigations of the United States Department of Agriculture of the texture and physical properties of the principal tobacco areas are throwing an important light upon this subject. The Havana tobacco, the Sumatra type of wrapper leaf grown in the Connecticut Valley, the white burley tobacco of Ohio and Kentucky, adapted to the English, German, Italian, Austrian, Swiss and Spanish markets; the pipe, chewing and cigarette tobaccos of Virginia and North Carolina, are each grown upon soils having certain physical properties due to the difference in the texture or structure of the soils. Some of these types have already been very fully worked out by the department, and with the work which has been done upon the soils of Maryland, it is believed that it will be possible now to point out which soils are adapted to any one of these several types of tobacco provided the climatic conditions are favorable. There are so many factors, however, which enter into the successful and economical production of a crop in the soil, climate, methods of cultivation and treatment that all innovations in the introduction of crops from widely separated localities should be commenced with extreme caution by experimenting on a small scale in actual field work.

Specialization has gone so far in agriculture, as it has in various other industrial lines, that our farmers can no longer expect to succeed unless they closely watch the markets and adapt their crops to the requirements of the markets. There is no single crop in which this specialization has been carried further than with tobacco. This has been brought about by the demands of trade, and has been met by the development of well-marked commercial types of tobacco originated through the selection of seeds and of soils. The mongrel type of Maryland tobacco of thirty or forty years ago, marketed with little regard to the seed or soil, would have little chance in the markets of the world to-day. Every tobacco planter should consider first, what types of tobacco are required in domestic or foreign markets, and secondly, which of these classes or types his soil and local conditions of climate are adapted to produce.

Work has been started on a study of the changes which have taken place in some of the worn-out tobacco soils of Southern Maryland, but our methods are not yet sufficiently developed to warrant much field work in being done. The same is true of the investigations which have been commenced in the study of the causes of the unfertility of the soils of the Potomac formation and of the "white oak lands" of the Eastern Shore.

Observations have been made during a part of the growing season in some of the principal soils of the State, of the amount of moisture they maintain for crops, but not so much work of this kind has been done this season as we hoped to do. It is difficult to find observers willing to do the necessary work involved in taking daily samples of soil, located on the typical soils which it is desired to study. It is hoped that more of this work can be done during the coming season.

Very truly yours,

MILTON WHITNEY,

Physicist.

THE ANNUAL FINANCIAL REPORT, 1894–1895.

The Maryland Agricultural Experiment Station in Account With the United States.

1894.						*Dr.*
July	1,	To cash unexpended of this date.....			$ 394.07	
1895.						
June,	30,	To receipts from the Treasurer of the United States in four payments, per appropriation for the year ending June 30, 1895, under Act of Congress, approved March 2, 1887.....			15,000.00	
June,	30,	To cash from sale of produce.....			299.89	
April,	6,	To cash from Allemand & Gallagher Insurance.....			274.38	
April,	20,	To cash from sale of beeves.....			473.88	
						$16,442.22
1895.		Nature of Expenditures.				*Cr.*
June,	29,	By cash paid salaries.....			$8,055.26	
"	29,	" " " labor.....			2,125.19	
"	29,	" " " publications.....			1,661.36	
"	29,	" " " postage and stationery..			140.21	
"	29,	" " " freight and express.....			218.43	
"	29,	" " " heat, light and water....			345.30	
"	29,	" " " chemical supplies.....			59.17	
"	29,	" " " seeds, plants and sundry supplies.....			291.30	
"	29,	" " " fertilizers.....			225.36	
"	29,	" " " feeding stuffs.....			264.03	
"	29,	" " " library.....			70.11	
"	29,	" " " tools, implements and machinery.....			331.39	
"	29,	" " " furniture and fixtures...			92.67	
"	29,	" " " scientific apparatus.....			41.10	
"	29,	" " " live stock.....			581.64	
"	29,	" " " exhibitions and meetings			483.05	
"	29,	" " " contingent expenses.....			15.25	
"	29,	" " " buildings and repairs....			825.06	
"	29,	" " " balance.....			616.34	
						$16,442.22

I hereby certify that the foregoing is a true transcript from the books of account of the Maryland Agricultural Experiment Station.

JOSEPH R. OWENS, *Treasurer.*

We, the undersigned, duly appointed Auditors for the corporation, do hereby certify that we have examined the books and accounts of the Maryland Agricultural Experiment Station, for the fiscal year, ending June 30, 1895, that we have found the same well kept and correctly classified as above, and that the receipts are shown to have been $16,442 22, and the corresponding disbursements, $15 825.88. Vouchers for this disbursement are on file, and have been examined by us, and are found correct, thus leaving an unexpended balance of $616.34, to be accounted for by the treasurer in the fiscal year commencing July 1, 1895.

(Signed.)

CHARLES B. CALVERT, } *Auditing Committee*
J. P. SILVER, } *Board of Trustees.*